NATIONAL OPTRONICS

# *Horizon II Edger*

## INSTRUCTION, OPERATION, MAINTENANCE AND TROUBLE SHOOTING MANUAL

NATIONAL OPTRONICS

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# SAFETY REMINDERS

- Do not run the edger until you have read and understand this Instruction Manual.
- If you are running the machine for the first time, ask your supervisor or a qualified operator for help.
- Plug the machine into a grounded 115V AC outlet only! Do not cut off the ground prong from the plug, or use any adaptor that will bypass the ground prong.
- The left cutter shield, the top cutter shield, and the shield keeper have been designed into the Horizon II to protect operating personnel from rotating cutter blades. All machine covers and guards should be in place when operating the machine, and any alteration, removal, or damage of these parts will cause a **serious safety hazard**, as well as void any warranty.
- The Horizon II edger should be **lifted** very carefully by two people. Before attempting to move or lift the edger, ensure that all electrical connections and the vacuum hose are disconnected from the edger. To lift the edger, each person should carefully lift the edger from the bottom of each edge, using both hands.
- Always assume power is on until you check and verify that the main power and/or motor power switches are off.
- When changing the insert, make sure the clamp is tight before starting the edger.
- Always turn the power off when anyone is performing maintenance.
- Do not use the machine when taking any medication that may affect sight or coordination.
- Hearing protection is recommended. Under normal operation, the Horizon II operates at a sound level below 80db. However, when running very thick polycarbonate lenses, the sound level may momentarily peak at 90db. Prolonged exposure at this level may cause hearing damage. Under such operating conditions, hearing protection is required by law.

## THINK SAFETY AND PRACTICE SAFE

### WORK HABITS IN THE LABORATORY AT ALL TIMES.

# TABLE OF CONTENTS


Page

**INTRODUCTION TO OPERATION** . . . . . **6**

**INSTALLATION PROCEDURES** . . . . . **7**

**OPERATING PROCEDURES** . . . . . **9**

Review of the Control Panel . . . . . **9**

Sizing and Bevel Placement Adjustment Controls . . . . . **11**

Edging A Lens . . . . . **12**

Bevel Placement Systems: Two Alternatives . . . . . **13**

Front Curve Tracking Bevel System In Place

Multi-Cam Tracking Bevel Placement System

Flow Rate Control . . . . . **16**

Periphery Finishes . . . . . **17**

Grooving Procedures

Rimless Procedures

Roll and Bevel Procedures

To Recut for Size

Shelving Procedures

Faceting Procedures

Cutters . . . . . **20**

Removing/Installing the Cutter Body

Replacing the Cutter Inserts

Special Capabilities . . . . . **23**

Pattern-From-A-Pattern Duplication

Pattern-From-A-Lens Duplication

Safety Features . . . . . **24**

**PERIODIC MAINTENANCE:**

On a Daily Basis . . . . . **25**

Every 300 to 500 Cycles . . . . . **27**

Every 300 Edges . . . . . **27**

Every 2500 Edges or 30 Days . . . . . **28**

**OPERATING SPECIFICATIONS:**

Air Pressure . . . . . **29**

Lens Spindle Speed . . . . . **29**

Carriage Flow Rates . . . . . **29**

Lens Drive Carriage Flow Rate . . . . . **29**

Cutter Motor Carriage Flow Rate . . . . . **29**

Differential Flow Rate . . . . . **29**

Differential Settings . . . . . **30**

Size . . . . . **30**

## TROUBLESHOOTING:


Page

**Lens Quality** . . . . . **31**
- Bumps on Periphery . . . . . **31**
- Incomplete Bevels . . . . . **32**
- Rough Finishes . . . . . **32**
- Marks, Scratches or Indentations on Surface . . . . . **33**
- Lenses Off Axis . . . . . **34**

**Electrical Failure** . . . . . **36**
- No Electrical Power . . . . . **36**
- Edger Circuit Breaker Continuously Trips . . . . . **36**
- Loss of Control Panel Functions . . . . . **36**

**Cutter Motor** . . . . . **36**
- Cutter Motor Doesn't Run . . . . . **36**
- Motor is Noisy . . . . . **37**

**Cycle Irregularities** . . . . . **38**
- Edger Won't Cycle . . . . . **38**
- Neither Motors Run . . . . . **38**
- Carriage Flow . . . . . **40**

**Lens Drive Assembly** . . . . . **42**
- Lens Drive Motor Continues to Run . . . . . **42**
- Lens Drive Motor Doesn't Run . . . . . **42**

**Solenoid Valves** . . . . . **44**

**Flow Restrictors** . . . . . **46**


## PARTS REPLACEMENT:


Replacing the Cutter Motor . . . . . **49**

Replacing the Control Panel . . . . . **49**

Replacing the Lens Drive Assembly . . . . . **50**

Replacing the Lens Drive Brake . . . . . **50**

Replacing the Solenoid Valve . . . . . **51**

Replacing the Solenoid Valve Block Assembly . . . . . **51**

Replacement Fuses . . . . . **52**

**BOSCH MOTOR ADDENDUM:** . . . . . **53**

Replacing the Cutter Inserts . . . . . **53**

Resharpening Service . . . . . **54**

**REFERENCE DRAWINGS:**

Horizon II Dry Bevel Edger


Part No. Reference Diagram . . . . . 55

Pneumatic Assembly Diagram . . . . . 56

Pneumatic Diagram . . . . . 57

Wiring Diagram . . . . . 58

Interconnecting Wiring Diagram . . . . . 59

Control Panel Assembly . . . . . 60

Accessory Kit Parts List . . . . . 61


# TABLE OF FIGURES:


Figure 1 Bench Layout Diagram . . . . . 7

Figure 2 Control Panel . . . . . 9

Figure 3 Sight Line and Guide for Bevel Placement . . . . . 12

Figure 4 Front Curve Tracking System in Place . . . . . 13

Figure 5 Multi-Cam Tracking Bevel Placement System . . . . . 14

Figure 6 Bodine Beveling Cutter Body . . . . . 22

Figure A1 Bosch Cutter Body . . . . . 53

# INTRODUCTION TO OPERATION

The patented Horizon II is a router-type edger for plastic lenses which dry cuts all plastic lenses, including Polycarbonate, to shape and size, rather than grinding them with diamond wheels. Its fully automatic cutting operation can apply any one of four standard finishes to the periphery: a hide-a-bevel, a modified $5^{o}$ hide-a-bevel, a rimless edge, and a groove. With the addition of specialty cutters, the Horizon II can also apply other finishes with a degree of precision not found on many conventional edgers, including a roll and bevel, a facet, a safety hide-a-bevel, and a shelf for snap in frames. All powers and sizes of lenses are edged in the same cycle time of less than 1 minute, except faceting and shelved jobs, which require two cycles.

Lenses are cut with a cutter 3/4" in diameter with a single carbide insert. The cutter is driven by a brushless DC motor at 15,000 rpm. The various edge finishes are formed with different cutters, which can be changed in less than a minute. Removed material is sucked into a dry vacuum unit and therefore no coolant is needed. The resulting debris is comprised of inert material, and can be safely disposed with typical office refuse.

Two tracking systems are supplied. With the first, a white Teflon bevel guide wheel accurately tracks the actual front of the lens. With the second, a bevel is placed on the lens by following a pre-determined base curve of 2, 4, 5, 6, 7, or 8, through the use of cams. Changes between tracking methods can easily be accomplished in 30 seconds.

Size and bevel placement adjustments on the Horizon II are made with dials found outside of the unit's case. Due to the unique design, the operator can clearly observe the entire edging cycle from start to finish. The option is also available that enables the operator to control finish bevel (or groove) placement after the lens is roughed into shape, allowing for greater precision. Pattern-from-a-pattern and pattern-from-a-lens duplication are also standard features.

The Horizon II is supplied with standard air-chucking for both the pattern and lens. In addition, the sophisticated pneumatics of the unit make it possible to adjust the pressure of the pattern against the pattern roller when utilizing thin lab-made patterns, or demo lenses. The system also provides a pressure adjustment of the bevel guide wheel against the lens, enabling the edger to track even the thinnest lenses with total accuracy.

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### *Statement Against Misuse*

The Horizon II edger is designed to edge plastic lenses only. Any other use of the machine will compromise its safety protection features. Under no circumstances should any attempt be made to edge a glass lens on this unit!

**THE HORIZON II WILL EDGE ONLY PLASTIC LENSES.**

# INSTALLATION PROCEDURES

**Note:** These procedures should be followed in sequence, as the proper completion of a given step may depend on the one previous to it. Assorted hex key wrenches are supplied in the accessory kit to aid in the installation and operation.

**BENCH PREPARATION:**

Prepare the bench surface to be used by cutting an opening for the vacuum's hose and power cord per Figure 1.

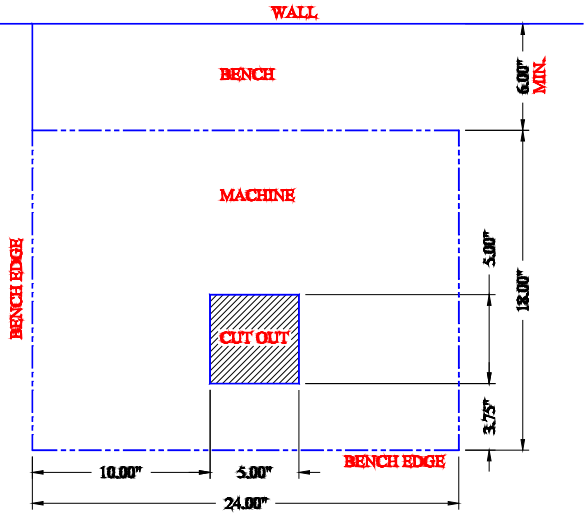



***Fig. 1 – Bench Layout***

**UNPACKING THE EDGER:**

1. Free the edger from its wooden shipping pallet by removing the two bolts found on the pallet's underside with a ¾" box wrench.

2. Place the edger on the bench, aligning the vacuum coupler on the underside of the edger with the bench opening.

3. There are two shipping bolts that need to be removed to operate the edger. They are two socket head shipping bolts on the underside of the edger. The bolts are tagged. Remove these bolts to free the cutter motor carriage and the lens drive carriage.

4. Pull the bevel guide wheel adjustment rod (its control knob is on the right side of the edger) fully *to the right.* This will free the top case from the safety lockout rod.

5. Remove the tie-down straps that hold the clear plastic shield. The straps are on the left side of the edger.

6. Release the case top draw latches on each side of the edger and lift the top to the open position to provide access to the inside of the edger.

**UNPACKING AND ATTACHING THE VACUUM SYSTEM:**

1. Remove the vacuum unit from its carton. Remove the accessories from the inside of the canister and install the blue vacuum bag. Place the vacuum under the workbench, aligning its inlet with the bench opening.

2. Feed the vacuum power cord through the bench opening and lay it towards the rear of the bench, as it will be plugged into the edger.

3. Turn the power switch on the vacuum to the ON position, as its cycling will be automatically controlled.

4. Insert the end of the 2 ½" flex vacuum hose into the coupler on the bottom of the edger from below the bench. This connects the hose to the chip chute, the device in the edger that captures the plastic debris.

5. Maintaining a gentle curve between the chip chute and the vacuum, connect the other end of the 2 ½" hose to the vacuum inlet. **NOTE:** The vacuum inlet is the *lower* hole in the vacuum canister. The 2 ½" hose can be cut to the shortest length possible with a utility knife and a pair of wire cutters. The shorter the hose, the more effective the suction.

**ATTACHING THE COMPRESSED AIR LINE:**

1. The compressed air connection is on the right side of the edger towards the rear. Install the filter regulator assembly provided with the edger by inserting it into the quick-connect bulkhead fitting.

2. Attach the quick disconnect onto the end of the air line to be used. The ring on the quick disconnect fitting can be pulled back, and the air line pushed onto the male fitting of the filter regulator assembly.

3. Verify the pressure is at 80 psi on the filter regulator gauge. If not, locate the adjustment knob on top of the filter regulator assembly. Move the yellow locking ring to the up position, adjust the pressure, then push the yellow locking ring down into the locked position. It is required that 80 psi be maintained for the edger to operate properly. Clockwise will increase pressure, counter-clockwise will decrease pressure.

4. The pattern tracking pressure gauge on the front panel of the edger is factory set and should read 35 psi when the inlet pressure reads 80 psi. If it does not read 35 psi, adjust it accordingly, using the adjustment knob on the control panel directly below the gauge.

**ELECTRICAL CONNECTIONS:**

1. Plug the vacuum cord that was laid on the rear of the bench into the appropriate socket on the back of the edger.

2. Check to assure that all panel switches are in the *raised*, rather than the depressed, position. Also, ensure that the power switch on the right side of the control panel is in the OFF position.

3. The HORIZON II Edger is designed to be connected to a grounded 115V, 60 Hz power supply. The wall receptacle should be of **at least 15 amp capacity.** The power consumption of the edger is 12.4 Amps. Connect the supplied power cord from the back of the edger to a 155VAC wall receptacle.

## OPERATING CONDITIONS:

The HORIZON II is designed for indoor use only. The edger is designed to operate safely at a temperature range of 5° C to 40° C, at altitudes up to 2000 meters.

# THE EDGER IS NOW SET UP TO OPERATE.

# OPERATING PROCEDURES

## REVIEW OF THE CONTROL PANEL:

The following section describes the various Control Panel switches, controls, and indicators, as displayed in Figure 2.

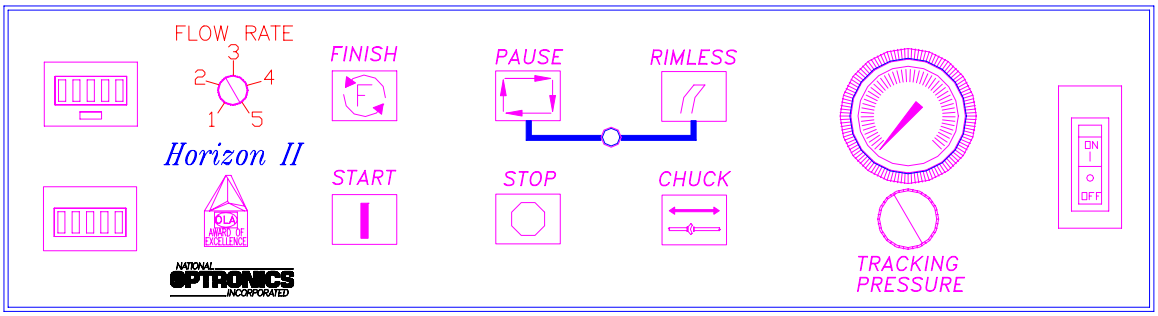



***Figure 2: Control Panel***

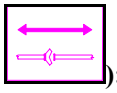
Looking from Right to Left:

**On/Off Circuit Breaker:**

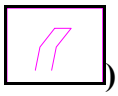
This switch controls line power to the edger and vacuum. It contains an integral 20 amp resettable circuit breaker for overload protection.

**Tracking Pressure Gauge/Regulator Control Knob:**

The pressure gauge indicates the pressure of the pattern against the pattern roller and the pressure of the bevel guide wheel on the lens. It is factory set at 35 psi, and, if required, can be adjusted by turning the knob directly under the gauge.

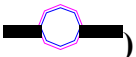
**Chuck (Blue -  ):**

This button simultaneously activates the lens and pattern clamps. Since the pattern is spring clipped on, the operator's left hand is free to hold the lens during chucking.

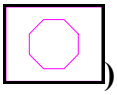
**Rimless (Grey -  ):**

With this button engaged, the edger cuts the lens to a straight rimless finish. **Note:** Activating the rimless lock control does not correct for size. The running of a rimless job will be covered later.

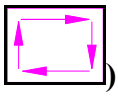
## OPERATING PROCEDURES

**Indicator Light (Red -  ):**

When the Pause and Rimless buttons are engaged, this indicator lights to show that the edger is in the Flow Control mode. (See Flow Control Knob.)

**Stop/Reset (Red -  ):**

Pressing this button at anytime will abort the cycle and return the lens drive/cutter motor carriages to their start position.

**Pause (Yellow -  ):**

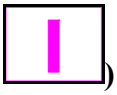
The Pause control can be used in two modes:

1. When engaged during the first half of the cutting cycle (roughing), it will **freeze** the cycle. It will complete the roughing cycle but prevent the edger from advancing to the finishing cycle until it is released. The lens spindle and cutter motor will continue to rotate.

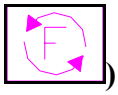
2. When engaged during the second half of the cutting cycle (finishing), the lens spindle and cutter motor will continue to rotate, but the cycle will not advance until the Pause button is released.

The Pause button is also a visual indicator as to whether the edger is in the roughing or finishing cycle, as the switch light flashes during the finishing half of the cycle.

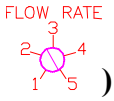
The Pause feature is particularly helpful when executing mid-cycle adjustments to the bevel (or groove) placement. **For example,** if an operator wished to check groove placement on a thin-edged, high plus lens prior to final sizing, he or she could set the sizing dial 2mm oversize and stop the cycle during the finishing (grooving) operation. After fine adjustments, the cycle could be resumed by turning down the sizing dial to the correct size, and releasing the Pause button.

**Start (Green -  ):**

This switch begins the edging cycle.

**Finish Only (Orange -  ):**

Engaging this switch, before pressing the Start button, will permit the edger to run the finish portion of the cycle only. This should be used for recutting and touch-up only. Running uncut lenses in this mode may result in axis and finish problems, as well as possible damaged lenses and blades.

**Flow Control (Knob - 

)**

When the edger is in the Flow Control mode (Rimless & Pause buttons engaged), the speed of the feed rate of the lens into the cutter can be varied from approximately 1mm to 8mm per lens revolution. This knob setting controls the speed.

**Cumulative Cycle Counter:**

The lower counter on the left side of the control will register the total number of cycles (full and finish only) of the edger. It should initially read 20-100 cycles, as the edger is tested prior to shipment.

**Resettable Cycle Counter:**

The upper cycle counter on the left side of the control panel is "resettable", similar to a trip odometer in an automobile. The counter is provided for scheduling maintenance or measuring operator performance. **Note:** To prevent accidentally resetting the counter during operation, you can insert a small pin in the hole of the reset button.

## SIZING AND BEVEL PLACEMENT ADJUSTMENT CONTROLS:

**Sizing Dial:**

The dial on the left, front corner of the edger controls the size setting. The "size-on-size" settings are the U.S. convention of 36.5mm for beveled lenses, 38.5mm for rimless lenses. The dial is engraved with a 10mm scale.

**Bevel Placement Adjustment:**

The knob on the right side of the edger controls the front-to-back location of the bevel or groove on the edge of the lens.

**EDGING A LENS:**

The edger is shipped with the beveling cutter body installed in the cutter motor. It is highly recommended that the operator run several test lenses to become familiar with the Horizon II's operation prior to beginning production.

1. With the clear Plexiglas shield raised, mount the frame pattern on the spring clip on the left side of the lens drive motor shaft. Nasal facing front makes "R" and Nasal facing rear makes "L".

2. With the left hand, fit the blocked lens into the chuck adaptor end of the lens drive motor shaft. While holding the lens in position, press the **Chuck** button. Both the pattern and lens clamp will close.

3. Close the Plexiglas shield.

4. Set the desired size. The sizing dial on the left side of the edger reads in millimeters and the indicator plate above the dial in centimeters. The edger uses the U.S. convention of 36.5mm as the size-on-size setting for beveled lenses.

5. Set the bevel placement by turning the knob on the right side of the edger either clockwise or counter clockwise. This controls the position of the Teflon tracking wheel and its relative position to the cutter. Clockwise rotation will shift the bevel toward the back of the lens. There is a sight line and guide (*Fig. 3*) that is used by the operator to judge the relative position of the bevel placement. It is located on the inside of the edger and is viewed through the Plexiglas shield.

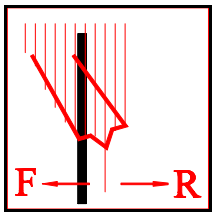



***Figure 3: Sight Line and Guide***

6. Press the **Start** button. The edger will automatically edge the lens in 50 seconds.

7. After edging the lens, raise the Plexiglas shield, hold the lens with the left hand, and disengage the **Chuck** button with the right hand. Both the lens and pattern clamp will open and the operator can remove the lens.

It is suggested that the operator now run additional test lenses, changing the bevel placement and size. The operator can also experiment with the three control features (**Finish Only**, **Rimless**, and **Pause**), to gain a familiarity with the edger's operating sequence and controls.

## BEVEL PLACEMENT SYSTEMS - TWO ALTERNATIVES:

The edger is supplied with two methods of controlling the placement of the bevel (or groove) on the periphery of the lens.

### Front Curve Tracking Bevel System In Place

The bevel guide wheel tracking system uses a Teflon wheel, which tracks the front curve of the lens (***Fig. 4***). The position of the wheel is controlled by the knob on the right side of the edger.

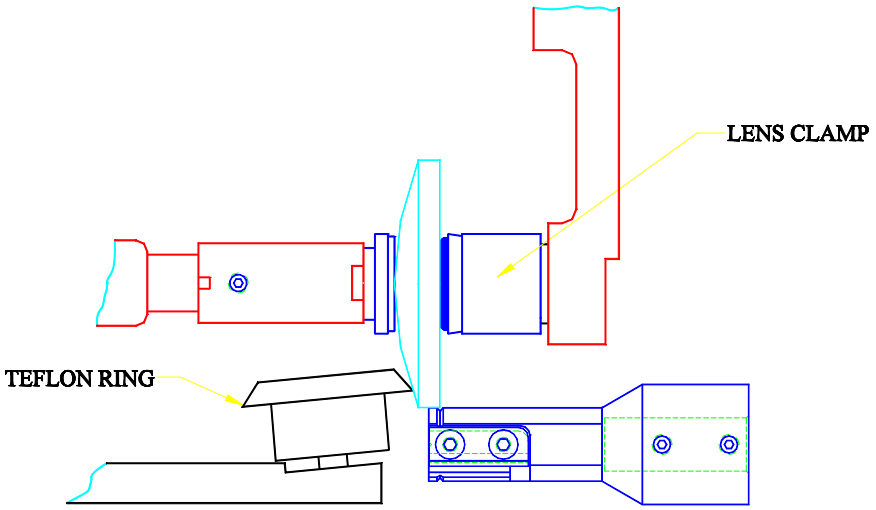



***Figure 4 – Front Curve Tracking System in Place***

It is important that the edge of the Teflon guide wheel be concentric within a few thousandths of an inch, as the bevel, groove and facet placements on the lens are extremely responsive to the position of the wheel. It is advisable to occasionally run your finger around the wheel edge to dislodge any particles and check for wear. See the Maintenance section for instructions on changing the wheel.

**Note:** The position of the bevel guide wheel is factory-set at the beveling position. When running faceted lenses, the wheel must be raised away from the cutter to allow clearance for the top of the ramps. (Refer to the Faceting procedures.)

## Multi-Cam Tracking Bevel Placement System

The second bevel placement method is the multi-cam tracking system. The system utilizes a stair-step cam mounted on the lens drive motor carriage, and a cam follower assembly that replaces the bevel guide wheel assembly. The cam has six "steps" that approximate nominal 2, 4, 5, 6,7, or 8-base fronts.

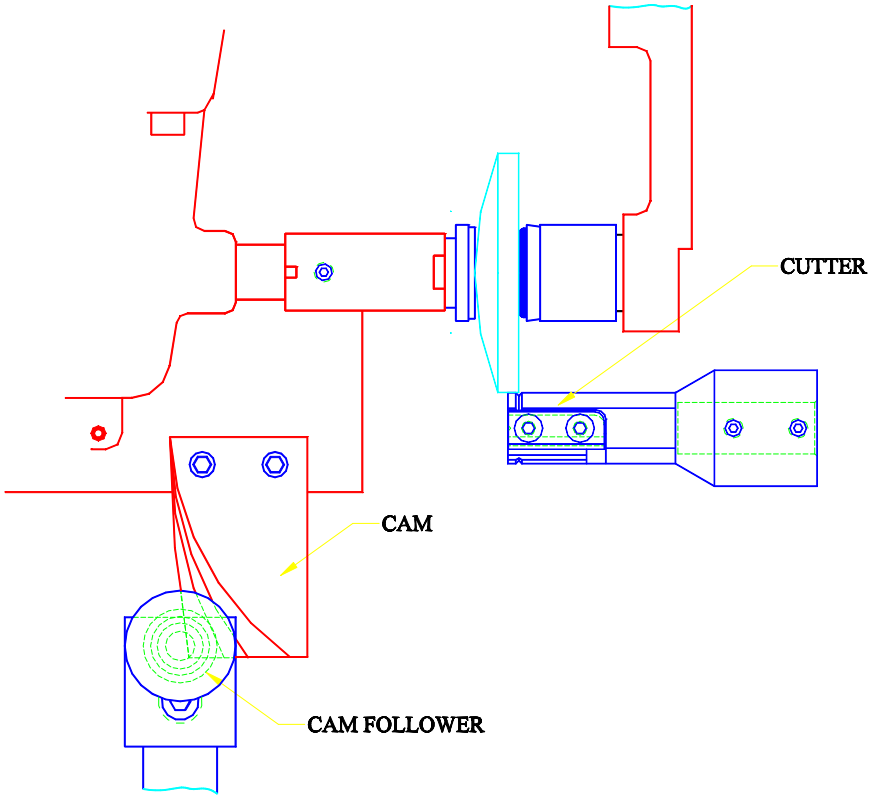



***Figure 5 – Multi-Cam Tracking Bevel Placement System***

The Multi-Cam System is most effective with:

1. Half-eyes
2. Irregular fronts, such as executives or lenticulars
3. Lower-base lenses, when a high-based curve is needed for frame insertion (such as inserting a 2-base lens into a 6-base frame).

**Changing Bevel Placement Systems:**

To change from the bevel guide wheel system to the multi-cam system:

1. Remove the bevel guide wheel assembly from its slide block by loosening the knob (post lock) on the left side of the slide block. It is helpful to remove the air supply and slide the cutter motor carriage to the left by pushing the bevel placement control rod. This will allow clearance for the assembly.

2. Slip the bevel guide wheel assembly from the mounting block and replace it with the cam follower assembly provided in the accessory kit.

3. Secure the cam follower assembly by retightening the knob (post lock).

The cam follower shaft position can be changed from one base curve to another by pulling or pushing the knob up or down. The cam follower will ride on the selected curve whose number appears just above the shaft block.

**Note:** The cam follower assembly is calibrated for each machine. If you are running multiple edgers side-by-side, be sure to use the particular assembly supplied with each machine.

## FLOW RATE CONTROL:

The Flow Control Cycle feature is used when edging dense material lenses, such as polycarbonate or high index, particularly blanks over 75mm. To engage the cycle, press the **Rimless** and **Pause** buttons on the control panel. The LED (red light) between the two will light up, indicating that the flow rate control is engaged. The Flow Control Knob can then be set to a feedrate. The higher the number on the dial, the faster the feed. The feedrate per lens revolution will range from approximately 1mm (Setting #1) to 8mm (Setting #5).

Once the lens has roughed down, the operator must release the **Rimless** and **Pause** buttons in order to finish the lens.

Use of this feature will prevent axis slippage when edging dense material lenses, while allowing these lenses to be edged in one cycle. Also, in the case of thin centered, anti-refection coated lenses, the flow rate control can minimize the strain put on the center of the lens.

The Flow Control Cycle is a standard feature on all edgers shipped after April 1990. Retrofit kits are available for Horizon II's shipped prior to that date.

## PERIPHERY FINISHES:

The "V" of the hide-a-bevel insert set has a depth of 1mm and included angles of 115°. This results in a 120° angle on the lens bevel. To bevel a lens, follow the procedures in the EDGING A LENS section. The front-to-back location of the bevel can be adjusted using either of the two systems explained in the BEVEL PLACEMENT SYSTEMS section.

### Grooving Procedures:

In the hands of an experienced operator, the edger will groove a lens periphery as thin as 2mm. The beveling cutter must first be replaced with the grooving cutter.

> **Note:** The edger's sizing dial is set for beveling. Rimless cuts *require an overset of 2mm* to compensate for the depth of the bevel.
> Size-on-size setting for beveling = 36.5mm.
> Size-on-size setting for rimless = 38.5mm.

> **High Plus Lenses – A Helpful Hint:** It is very difficult, at times impossible, to place an acceptable groove on a high plus lens while using the front tracking bevel placement system (Teflon wheel system). It is suggested that the operator cut the lens using *the multi-cam system*. The lens should be cut oversize, to check groove placement, before bringing it down to final size.

#### Rimless Procedures:

Most insert sets, with the exception of the modified hide-a-bevel cutters which have a 5°, 7°, or 12° rise, can cut a rimless lens by engaging the **Rimless** lock switch on the control panel, prior to edging the lens.

**Note:** As with grooving, the size setting must be overset by 2mm to account for the depth of the bevel.

#### Roll and Bevel Procedures:

In order to achieve a roll and bevel effect on a lens, the special roll and bevel cutter inserts, and reinforced cutter body must first be installed in the edger. Then proceed as follows:

1. Set sizing knob 6mm over anticipated finished size.
2. Activate the **Rimless** and **Pause** buttons. This activates the flow control cycle. Set the flow rate control knob to the speed appropriate to the material that is being cut. A good rule of thumb is 1 for polycarbonate, 3 for high index, and 5 for CR39.
3. **Start** cycle.
4. After roughing is complete, and the lens is rotating away from the blades, release the **Rimless** button. The lens will then shift in front of the orange mark on the cutter body.

5. Release the **Pause** button, and let the lens drop down into the bevel. The **Pause** light will begin blinking as the lens drops in to bevel. **Activate the Pause button as soon as the light starts blinking.** This causes the lens to continue rotating in front of the orange mark on the cutter body. Check bevel placement. Gradually turn the sizing dial to the desired set size while giving attention to the bevel placement.

6. After the lens has made one complete revolution at the desired set size, press the **Stop** button to halt the cycle. This causes the lens drive carriage to back straight out, and will save the lens from being damaged by the cutter inserts.

7. Check size of lens in frame.

**To Recut for Size:**

1. Adjust the sizing knob to the anticipated 6mm oversize mark, so that the lens will not accidentally be clipped by the cutter inserts. Activate the **Pause** button.

2. Press **Finish**, then **Start**. The lens will move down in front of the bevel.

3. Adjust sizing dial to correct size.

4. Repeat steps 6 and 7 from above.

## Shelving Procedures:

Shelving is appropriate for snap-in type frames, such as high-style sunglasses and some sports frames. To achieve a shelf on a lens, first a specially crafted shelving cutter body is needed, as well as shelving blades. These are not included with the basic equipment. If interested, please contact the factory for more details.

As with any new procedure, it is recommend that the operator practice with a junk lens when attempting this for the first time.

1. Install the shelving body with cutter inserts into the Horizon II.

2. Push the **Rimless** button. Set sizing knob to final size, which should be the 'A' measurement of the unshelved portion of the lens, allowing for the 2mm rimless

   overset. If not sure of final size, adjust sizing knob a little big. Press **Start**, and allow cycle to finish normally.

3. Check size of lens. It should be approximately 2mm larger than the frame opening, so that the shelf will fit snugly in the frame when it is finished. If it is too big, run a second rimless cycle to bring it down to size.

4. Once sure of final size, replace the lens into the chuck, and release the **Rimless** button. **Leave the sizing dial set at the final size.** Press **Finish** only button and then **Start**.

5. Press the **Pause** button when it begins to blink.

6. The lens will sit in front of the shelving portion of the cutters. By using the bevel adjustment knob on the right side of the edger, adjust the cutters so that the shelf on the front of the lens will be as wide as needed. The size of the gap from the end of the cutter inserts to the Teflon bevel guide wheel will determine the width of the shelf.

7. Once shelf width has been set, *slowly* turn the sizing dial down 4mm. **Release the Pause button.** Only the rear portion of the lens will be edged down. This will leave a 2mm deep shelf all around the front of the lens.

8. Make a note of the size settings for both the first and second cuts. Utilizing these settings, repeat the procedure for the left lens.

**Faceting Procedures:**

The Horizon II is capable of faceting a lens. This requires a double pattern/two-cycle method, as well as a specially crafted cutter body and cutter inserts.

1. Install the faceting cutter body with cutter inserts into the edger.

2. Raise the Teflon bevel guide wheel height to allow 1mm clearance for the ramps of the inserts. In this situation, the wheel's position is changed by sliding the bevel guide wheel (BGW) assembly out of the out of the mounting block by loosening the post lock knob. There is a line scribed onto the post of the BGW assembly that indicates the mounting position for faceting.

3. Move the BGW assembly to the proper position, and tighten the post lock knob.

4. Mount the rimless pattern specified by the frame manufacturer, and engage the **Rimless** button. Set the size with the required 2mm overset. Edge both the right and the left lenses as rimless, to ensure uniformity of the facet between both sides.

5. Bring them both down to the appropriate finished size.

6. Remove the rimless pattern and release the **Rimless** button.

7. Mount the facet pattern. Adjust the size by an additional overset, as specified on the pattern. This is usually 4-5mm. In order to allow for any corrections in the facet depth and width, it is advisable to then add another 2-3mm to the sizing knob adjustment.

8. Looking into the edger, adjust the position of the Teflon bevel guide wheel in relation to the ramp of the cutter insert. This position will determine the depth of the facet.

9. Press the **Pause** button, then begin the cycle. When the lens moves into position, use the bevel adjustment knob to make any necessary adjustments to the facet width. Once proper positioning has been determined, release the **Pause** button, and place a test facet on the lens. If the test positioning is acceptable, turn the sizing dial down to the appropriate adjustment, and edge the lens down the rest of the way.

10. Run the left lens, keeping the bevel adjustment and sizing knobs in the same position as used on the right lens.

## CUTTERS:

The disposable insert type of cutter used on the Horizon II is manufactured by National Optronics, Inc. There are five standard style cutters. They are:

| | |
|---|---|
| BEVELING | Part No. 93150 |
| MODIFIED 5° BEVELING | Part No. 93242 |
| GROOVING | Part No. 93302 |
| FACETING | Part No. 93190 |
| SHELVING | Part No. 93230 |

All of the cutters mentioned above have an outside diameter of 0.750" O.D. at their tips, with the exception of the Faceting cutter, which ramps from the 0.750" O.D. to a 1.165" O.D. at the tip.

In addition to the cutters listed here, there are several specialty cutters that are also available. There is a page towards the back of this manual that shows a complete listing of cutters for the Horizon II.

### Removing/Installing the Cutter Body:

To *remove* the cutter body from the motor:

1. Turn the control panel power switch OFF. Release the clasps on the side of the edger, and raise the top case.

2. The motor controller is located on the right side of edger. **Turn the toggle switch on the motor controller to the OFF position.**

3. Remove or swing the bevel guide wheel assembly 90° to allow access to the cutter.

4. Raise the flip-up cutter shield over the cutter body to allow access to the cutter body set screws.

5. With the hex wrenches provided, loosen the set screws holding the cutter body to the motor shaft.

6. **Carefully** slip the cutter body from the motor shaft. **The blades are sharp!**

To *reinstall* the cutter body on the motor:

1. Clean the motor shaft with a solvent (acetone or alcohol) if any debris has collected on it.

2. **Carefully** push the cutter body onto the motor shaft as far as possible.

3. Tighten the set screws with the hex key wrenches.

4. Lower the cutter shield, reposition the bevel guide wheel, and **turn the motor controller toggle switch back to the ON position.**

5. Move the bevel guide wheel assembly back to its proper position.

6. Lower the top case, secure, and turn the control panel power switch to the ON position.

**Replacing the Cutter Insert:**

1. Using the "TORX" wrench provided in the accessory kit, loosen the screw that secures the retaining clamp. **Note:** A common mistake is to use an Allen wrench to remove the TORX screws. This will strip the screw, making the insert nearly impossible to remove.

2. Slip the insert out of the body.

3. Thoroughly clean the cutter body and the clamp in a solvent (acetone or alcohol) and blow it dry with the air gun supplied in the accessory kit.

4. Replace the insert by pushing it as far as possible to the back of the cutter body. This will ensure the alignment of the insert.

5. Alternate the tightening of each screw 2-3 times, until the clamp is evenly seated and tightened securely.

6. Verify size.

**SAFETY NOTE: FAILURE TO SECURELY TIGHTEN THE INSERT CLAMPS PRESENTS A SAFTEY HAZARD.**

## OPERATING PROCEDURES

In 1995, we began using a DC brushless motor, manufactured by Bodine, on all new Horizon II models. Below, ***Fig. 6*** represents the cutter body needed for this motor. If your Horizon II is not equipped with this type of motor, please refer to the **Bosch Motor Addendum** at the back of this manual.

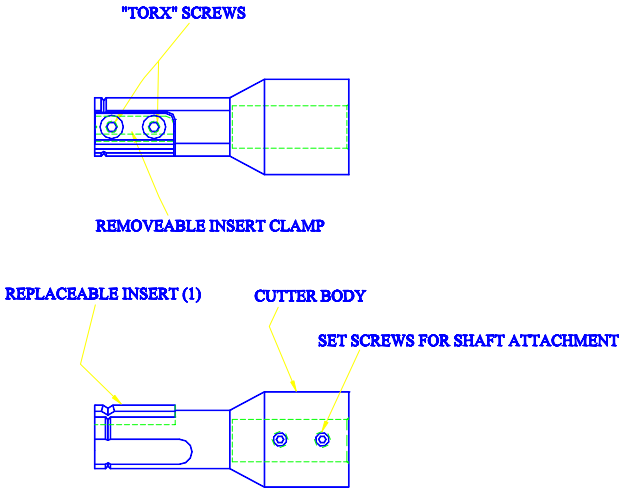



***Figure 6 – Bodine Beveling Cutter***

## SPECIAL CAPABILITIES:

### Pattern-From-A-Pattern Duplication:

To duplicate a pattern from a pattern:

1. Place the pattern to be copied on the pattern retainer.

2. Utilizing the special pattern duplicator adaptor (PDA) found in the accessory kit, mount a pattern blank on the adaptor. Chuck the blank into the lens clamp.

3. Engage the **Rimless** button, and set the size at 38.5 (36.5mm for size-on-size plus the 2mm overset for rimless cuts).

4. Edge the pattern for an exact copy.

### Pattern-From-A-Lens Duplication:

To duplicate a pattern from a lens:

1. Determine the mechanical center of the lens, using a protractor or a box-a-graph. Using the special pattern-from-a-lens (PFL) brass adaptor in the accessory kit, block the lens on the *concave* side with a LEAP pad.

2. Place the lens on the edger's pattern retainer as you would a pattern.

3. Utilizing the special pattern duplicator adaptor (PDA) found in the accessory kit, mount a pattern blank on the adaptor. Chuck the blank into the lens clamp.

4. Engage the **Rimless** button, and set the size at 38.5 (36.5mm for size-on-size plus the 2mm overset for rimless cuts).

5. Reduce the pattern tracking pressure on the front control panel to 30psi, and edge the pattern blank. This reduction in pressure will prevent thin lenses from bending on the pattern roller.

6. Remove the cut pattern and verify that it matches the lens perfectly.

## SAFETY FEATURES:

National Optronics, Inc. has incorporated several safety features into the Horizon II Bevel Edger. Removing or disabling any of these safety features could result in serious injury to the operator, and will null all liability on the part of National Optronics, Inc.

### Safety Shield Keeper:

The safety shield keeper prevents the Plexiglas lid from being opened during the cutting cycle until the cutter motor has fully retracted behind its shields at the end of the cycle.

### Plexiglas Lid Mercury Switch:

The mercury switch located on the Plexiglas lid prevents the cycle from starting before the lid is closed.

### Cutter Motor Mercury Switch:

The cutter motor mercury switch, located inside the case top to the right of the edger, prevents the cutter motor from receiving power while the case lid is open for periodic maintenance or repairs.

### Cutter Top Shield:

The cutter top shield, which is hinged above the cutter, is designed to prevent the operator from accidentally coming into contact with the cutting blades when inserting or removing a lens from the chuck.

## ON A DAILY BASIS:

### Clean the interior:

The interior of the edger should be cleaned on a daily basis using the vacuum to remove debris that escapes the chip chute during normal operation. A 1½ inch by 6 foot flexible hose and crevice tool are provided with the vacuum for this purpose. Also, an air gun is provided with the accessory kit, to be attached to the compressor hose during the cleaning process.

1. Switch the On/Off button on the control panel to the **Off** position.

2. Remove the filter regulator from the right side of the edger, then detach the compressor hose quick-disconnect. Attach the air gun to the compressor hose.

3. Remove the 2 ½" hose from the vacuum canister's inlet and install the 1 ½" hose fitted with the crevice tool.

4. Move the **toggle switch** on the back right corner of the Horizon II to the down position. This will turn on the vacuum independently of the edger's operation.

5. Vacuum debris from the inside of the edger with the crevice tool, being careful not to disturb the control wiring. Then depress the trigger on the air gun to blow hard-to-reach debris into the path of the crevice tool, ensuring that the edger is clean.

6. Reverse steps 4 through 1 to return the edger to normal operation.

The exterior of the Horizon II can be cleaned with a mild, non-abrasive detergent.

### Drain the Air Filter:

The filter regulator assembly is located on the right side of the Horizon II towards the rear of the machine. Any moisture that has accumulated should be drained by pressing up on the valve stem located at the bottom of the bowl.

### Check the Air Pressure:

The pressure on the right side of the edger should read 80 psi. It can be adjusted by pulling up on the yellow locking ring, and turning the knob on top accordingly, then pushing the yellow ring down into the locked position. Should the pressure drop too low, lens slippage could occur. For normal operations, the tracking gauge should read 35 psi.

**Check the Teflon Bevel Guide Wheel:**

The guide wheel should be checked for wear and contamination. If the guide wheel is nicked or gouged, or feels rough to the touch, it will need to be replaced. Any wax pen buildup should be removed with rubbing alcohol and the guide wheel allowed to dry thoroughly before being used. **Do not** attempt to smooth the guide wheel on a hand stone or buffing wheel, as this will glaze the surface, causing possible lens damage.

Check the height of the bevel guide wheel. For proper operation, the distance between the cutting edge of the cutter and the flat underside of the Teflon bevel guide wheel should be **1 to 1.5mm**. The height is adjusted by tightening or loosening the set screw that holds the BGW bearing assembly to the flat back plate.

**Check the Right Side Clamp Plug:**

If the rubber plug that goes into the right side clamp is worn, the clamp does not hold as well as it should. The result could be twisting of the lenses on the blocks, or the brass portion of the clamp could damage the back surface of the lenses. Replace the clamp plug **every thirty days**.

To change the plug-style clamp pad:

1. Remove the old plug and press in the new one.

To change the old style glue-on clamp pad:

1. Remove the right side clamp from the edger by removing the mounting screw running through the right side of the lens clamp arm.

2. Pull the old rubber plug from the brass portion of the right side clamp.

3. Flush out any debris, with alcohol, that may have accumulated in the clamp. Then wipe down the outside of the clamp thoroughly, so as not to attract any more debris. **Never remove the brass portion of the clamp assembly from the stainless steel portion.**

4. Press the new rubber plug firmly into the brass portion of the clamp, making sure it is in all of the way.

5. Using the mounting screw to tighten it into place, insert the right side clamp into the lens clamp arm.

## EVERY 300 TO 500 CYCLES:

### Change the Vacuum Bags:

Both the blue collection bag and the white filter bag should be changed together. To ensure proper operation, the bags should be changed when the collection bag has reached 2/3 of its capacity or 300-500 cycles. While the filter bag is removed, inspect the foam filter sleeve located beneath the filter bag, and clean or replace as necessary.

To Change the Bags:

1. Remove the head of the vacuum unit by releasing the three restraining clips.
2. Slide the old collection bag off of the inlet fitting and dispose of properly.
3. Slide the fresh collection bag's rubber hole guard over the inlet fitting inside of the canister.
4. Expand the bag around the inside of the canister.
5. Squeeze the ends of the spring clamp securing the filter bag to the inlet cage on the underside of the vacuum head and slide it off the inlet cage.
6. Slip the filter bag off of the inlet cage and dispose of properly.
7. Inspect the foam filter sleeve for tears or holes. Clean or replace as necessary.
8. Slip a fresh filter bag completely over the foam filter on the inlet cage to the vacuum motor.
9. Slip the spring clamp over the inlet cage completely to secure the filter bag in place.
10. Place the head of the vacuum back on the canister, aligning the exhaust port on the head with the inlet of the canister, and secure the three restraining clamps.

## EVERY 300 EDGES: (For disposable single flute cutters)

### Change the cutter insert:

The cutter body should be removed from the motor, the old inserts discarded or returned for resharpening, the body cleaned, and a new set of inserts installed. See the Operation section for details on removing the cutter body and changing the cutter inserts.

**<u>EVERY 2500 EDGES OR 30 DAYS</u> - [Whichever comes first]:**

**Inspect Both the Lens and Pattern Clamp Assemblies for Wear:**

Apply hand pressure to the clamps and rotate. The clamps should turn smoothly. If any rough areas are detected, the clamp(s) should be replaced.

## AIR PRESSURE:

The recommended operating pressure of the edger is **80 psi**. This should be adjusted by the regulator located on top of the air filter on the right side of the unit. Should it be allowed to drop too low, lens slippage could occur. Excessive pressure, on the other hand, could result in premature clamp wear or lens damage. In some lenses involving fragile A/R coatings, this pressure msg. need to be reduced to 60 psi.

The tracking pressure is set at the factory at 35 psi. If flexing of thin patterns or lenses occurs, or when making a pattern from a lens, you may reduce the pressure. If is reduced below 25 psi, however, poor tracking may result. This will be indicated by misshape due to the pattern not tracking the pattern, or erratic bevel due to the bevel guide wheel not tracking the front of the lens.

## LENS SPINDLE SPEED:

The lens drive motor is an induction type, and its speed will not deviate. For reference purposes, the spindle shaft should make 1 revolution in approximately 9.4 seconds.

## CARRIAGE FLOW RATES:

The carriage flow rates are set by the use of Flow Restrictors and are not adjustable. However, the flow rates should be verified occasionally.

## LENS DRIVE CARRIAGE FLOW RATE:

The lens drive carriage flow cylinder shaft should take **26 to 29 seconds** to fully retract into its cylinder from the time the **Start** switch is depressed, or its control solenoid is activated manually. If the flow rate is found to be out of tolerance, refer to the Troubleshooting Guide for further diagnostics.

## CUTTER MOTOR CARRIAGE FLOW RATE:

The cutter motor carriage flow cylinder shaft should take **approximately 1 second to move to the left** when its control solenoid is activated manually. When the control solenoid is released, the cutter motor carriage should take **approximately 2.5 seconds to move to the right**. If the flow rate is found to be out of tolerance, refer to the Troubleshooting Guide for further diagnostics.

## DIFFERENTIAL FLOW RATE:

The differential should take **1.5 to 2 seconds to close**. To verify, pull the pattern roller lightly towards the front of the edger with the left hand and hold it there, then switch the power on and off with the right hand, pausing 5 seconds between positions. When

switched from Off to On, the differential should open (push away from the front of the machine) quickly. When switched from On to Off, the differential should close smoothly, taking approximately **1.5 to 2 seconds**. If the flow rate is found to be out of tolerance, refer to the Troubleshooting Guide for further diagnostics.

## DIFFERENTIAL SETTINGS:

The differential is set at the factory at **4.1- 4.5mm**. Note that our measurement system differs from that of a wheel system in that we are measuring the difference between the roughing and finishing cuts when both are done **rimless,** as opposed to measuring the difference between the diameter of the roughing cut and the finished beveled lens. Consequently, our method of differential measurement will result in a number greater than that of a traditional edger, which excludes the bevel depth. If adjustment is ever required, it can be accomplished by tightening or loosening the set screw located in the end of the sizing screw. Tightening the set screw will decrease the differential, while loosening it will increase the differential.

## SIZE:

The sizing dial is factory-set to reproduce size-on-size when beveling with the dial set at 36.5, in accordance to U.S. sizing conventions. If a setting other than this is desired or a sizing adjustment is needed, the dial can be reset by loosening the set screw found running through its periphery. Cut a lens so that it is perfectly sized to match the pattern, then loosen the set screw and rotate the dial to 36.5. Retighten the set screw, and the sizing should be correct. A test lens should be run to check the new sizing adjustment.

When using this Troubleshooting Guide, the steps within a given category should be followed in the sequence given. Since this guide lists the most probable cause of a problem first, it is best to follow accordingly. In some cases, a chain of tests makes the determination of the source of the problem, and each one is dependent on the test prior to it.

Should your review of the Troubleshooting procedures neither solve your problem nor indicate a necessary replacement of a specific part, please call the factory to speak with one of our Technical Support representatives.

Under certain circumstances, it may be necessary to disable one or more of the previously mentioned safety devices for diagnostic purposes. Any such action is **NOT** intended for the purpose of operating the edger and extreme **CAUTION** should be observed to prevent **SERIOUS INJURY.**

**Some items that prove useful for troubleshooting purposes:**

- hex key set that came with the machine, or a good set of Allen wrenches
- adjustable wrenches of various sizes
- silicone spray
- a digital multimeter (checks voltage and continuity)

## LENS QUALITY:

**Bumps on periphery:**

LARGE BUMPS ON BOTH TOP AND BOTTOM:

A. **The pattern tracking pressure is insufficient.** Ensure that the tracking pressure on the control panel is set at 35psi.
B. **The Bevel Guide Wheel is set too high** and is contacting the LEAP pad or block. Verify that the BGW is locked in its proper position for beveling, with the locating pin fully seated in the BGW slide block. If it is, then confirm that the BGW is adjusted to be within 1-1.5mm from the cutter insert.
C. **The eye size is too small** and the BGW is contacting the block. The minimum "B" dimension that can be edged with the standard BGW set-up is approximately 34mm. If a "B" dimension smaller than this is required, the base curve tracking system should be utilized.
D. **The pattern is too small** and the pattern retainer is riding on the pattern roller. The minimum "B" dimension of a pattern to be reproduced can be no less than 25.5mm.

SMALL BUMPS OR LIFT-OFF MARKS

**The differential is closing too slowly.** Follow the procedures in the Maintenance Section for verifying Differential Flow Rate.

**Incomplete Bevels:**

THE UNBEVELED PORTION OF THE LENS IS **HIGHER,** OR LARGER, THAN THE BEVELED PORTION:

**The differential is closing too slowly.** Follow the procedures in the Maintenance Section for verifying Differential Flow Rate.

THE UNBEVELED PORTION OF THE LENS IS **LOWER,** OR SMALLER, THAN THE BEVELED PORITON:

A. **The cutter motor carriage flow rate is too slow.** Follow the procedures on **Page 32** for verifying cutter motor carriage flow rate.
B. **The differential is opening too slowly** allowing the cutters to remove a small portion of the bevel at the end of the cycle. Follow the procedures on **Page 48** for removing and cleaning the differential flow restrictor.

**Rough Finishes:**

LINES ARE RUNNING ACROSS THE PERIPHERY OF THE LENS -

A. **The cutter insert is dull.** Install a new insert.
B. **The cutter is unbalanced.** Insure that the insert is fully seated in the cutter body.

PIT MARKS LIKE TINY BUBBLES APPEAR AROUND THE ENTIRE PERIPHERY OF THE LENS -

A. **The lens clamp is binding**. The brass swivel of the lens clamp must pivot freely in the clamp body, if it becomes contaminated with plastic debris, it may cause the lens to vibrate against the cutter as it attempts to rotate. Use alcohol to wash out the clamp removing any excess cleanser which may attract more debris.

B. **The nose bearing of the cutter motor is bad.** Replace the motor.

PIT MARKS ARE APPEARING ONLY ON THE CORNERS OF THE LENS-

**Excessive gear lash in the lens drive assembly.** Check lash play, as thrust plate wear may necessitate adjustment. Adjustments are made through a set screw and lock nut running through the rear of the Lens Drive Gear box. If

the gear lash is properly set, and these marks still occur, the lens drive assembly should be replaced.

To adjust gear lash:

1. Locate the Adjustment screw and lock nut in the back of the gear box.

2. Loosen the lock nut.

3. Using a 3/16" hex wrench, snug the set screw. DO NOT over tighten the set screw, apply only finger tip pressure to the hex wrench. Over-tightening the set screw will bind the motor.

4. Hold the set screw in place with the hex wrench, to prevent any further tightening, and retighten the lock nut.

CHIP IN LENS (AT ONE SPOT ON THE LENS. CHIP IS USUALLY TOO DEEP TO REMOVE ON A HAND WHEEL)-

A. **Bevel Guide Wheel is set too low.** Check to see that the BGW is set in accordance with the maintenance procedures.
B. **Differential is closing too quickly.** Follow the procedures on **Page 31** for verifying differential flow rate.

MARKS WHICH APPEAR TO BE SCRATCHES OR INDENTATIONS APPEAR ON THE FRONT OF THE LENS -

Although these marks appear to come from the Teflon Bevel Guide Wheel, the Teflon ring itself is soft and self-lubricating and cannot damage a lens at room temperature. The marks that occur are due to other contributing factors, most notably heat.

MARKS ON POLYCARBONATE LENSES -

A. **Dull Cutters.** It is important to keep heat build-up to a minimum when running Polycarbonate lenses. Dull cutters can produce enough heat to soften the lens and allow the BGW to cause depressions in the substrate beneath the anti-scratch coating.
B. **A Bad Cutter Motor.** A bad nose bearing in the cutter motor can cause heat build-up in the same fashion as dull cutters.
C. **Static Electricity.** Heat and humidity changes can cause static electricity to build up. Static will cause small cut particles to cling to the Teflon ring and

become imbedded in the surface of the lens. Spraying the Bevel Guide Wheel with Anti-Static Spray, which can be purchased locally, will remedy any static build-up. Also, grease on the BGW transferred from lenses can attract dust. Clean any grease marks off the lenses.

MARKS ON CR-39 LENSES -

A. **Dull Cutters.** Although heat is not a big concern with CR-39 as with Polycarbonate, extremely dull cutters can cause this problem.

B. **Static Electricity.** Static can cause the same problems as with Polycarbonate. However, with CR-39, if the scratches are not too severe or are mild aberrations, the lens can often be heated and wiped with a soft lint-free cloth to remove any plastic dust adhering to the surface of the lens. As noted above, ensure that the BGW is free of grease.

**Lenses Off Axis:**

Once set at the factory, adjustments to the mechanical axis setting rarely need to be made. Before attempting any adjustment, the following steps should be performed to verify that the axis setting is indeed off. Most perceived axis slippage is NOT the result of the edger being out of adjustment, but rather the result of LEAP pad flex from a binding lens clamp, dull cutters or reduced air pressure!

A. **Insufficient air pressure.** Verify that pressure on the gauge on the right side of the edger is set at 80 PSI Maximum.
B. **Dull Cutters.** Check the cutters for dullness in accordance with the Maintenance Procedure.
C. **Binding lens clamp.** Check the lens clamp assembly for wear in accordance with the Maintenance Procedure.

To verify the mechanical axis:

1. Place an Aviator-type pattern on the edger as if to edge a right eye.

2. Using the Pattern Duplicator Adaptor, supplied with the edger, mount a pattern blank with a true 180 line in the lens chuck.

3. Depress the **Rimless Lock** switch and edge the pattern blank.

4. Once the cycle is complete, hold the pattern blank in place and release the **Chuck Switch**. DO NOT remove the pattern blank.

5. While holding the pattern blank in place, remove the Aviator pattern, and flipping it upside down, place it back on the edger. DO NOT flip the aviator pattern for the left eye.

6. Close the lens chuck and edge the pattern blank a second time.

The two cuts made will create a tear drop shape. When the mechanical axis is properly aligned, the 180 degree line of the pattern blank will intersect the point of the tear drop shape. If not, the mechanical axis will need to be adjusted.

If the 180 line is below the point, the pattern retainer will need to be turned counter-clockwise.
If the 180 degree line is above the point, the pattern retainer will need to be turned clockwise.

To adjust the mechanical axis:

1. Loosen the center locking screw found on the pattern retainer.

2. Loosening the rear adjusting screw and tighten the front, will rotate the assembly counter-clockwise. Alternatively, loosening the front adjusting screw and tightening the rear one, will rotate the assembly clockwise. When tightening the screws be sure to apply enough pressure to hold the assembly in place.
   **Note to older Horizon II owners:** Prior to serial number 6777, Horizon II machines had a two-piece stainless steel pattern retainer on the Lens Drive Assembly. Adjustment of the mechanical axis is directly opposite of what is stated above. To rotate the pattern retainer counter-clockwise, loosen the front screw and tighten the rear screw. To rotate clockwise, loosen the rear screw and tighten the front.

3. Retighten the center locking screw.

4. Run another test pattern as before. If the 180 line does not line up with the point of the pattern blank, the procedure must be repeated.

## ELECTRICAL FAILURE:

### No Electrical Power:

A. **Edger Circuit Breaker.** The edger's circuit breaker is incorporated into the On/Off switch. To reset, move the switch to the Off position, and after pausing approximately 30 seconds, move the switch back to the On Position.
B. **Lab Circuit Breaker.** The line power should be rechecked. Unplug the vacuum unit from the edger and plug it into the receptacle that the edger is utilizing. If the vacuum operates the line, power is OK. If not, locate the lab's circuit panel and reset the breaker.

### Edger Circuit Breaker Continuously Trips:

A. **Bodine Cutter Motor Controller is shorted.** Switch the Cutter Motor Controller's switch to **OFF** position, insert a pattern into the pattern retainer and a lens block (not a full lens!) into the lens chuck, press the Chuck button, then press Start. This procedure is referred to as "cycling the Edger" throughout this Troubleshooting Guide. If the breaker holds, the cutter motor controller will need to be replaced.
B. **Vacuum Motor is Bad.** Switch the Vacuum to **OFF** position and cycle the edger. If the breaker holds, the vacuum motor will need to be replaced.
C. **Lens Drive Diode Pack is Shorted.** Disconnect the lens drive assembly and diode pack from the edger wiring harness and cycle the edger. If the breaker holds, the diode pack will need to be replaced.

### Loss Of Control Panel Functions:

When the power is switched ON, the ON/OFF switch light and the light inside the machine comes on. However, none of the control panel switches will function.

A. **Blown Transformer Fuse.** Locate the fuse holder located on the transformer mounting bracket. Remove the fuse and replace with a fresh fuse of the same rating.
B. **Control Panel Failure.** If replacing the fuse does not remedy the problem, replacement of the control panel is indicated.

## CUTTER MOTOR:

### Cutter Motor Does Not Run:

A. **Cutter Motor Mercury Switch malfunction.** The Cutter Motor Mercury Switch is located inside the case top secured to the right hand side near the wiring harness. It is tucked up into the sound coat foam.

1. Ensure the switch is tied securely to the inside of the case and is parallel with the case top.

2. Inspect the switch's leads for breaks and the connector to ensure it is firmly in place.

3. Verify the switch operation by unplugging the switch's amp-style connector and placing a jumper wire across the wiring harness receptacle. If the motor runs when the Edger is cycled, replacement of Mercury Switch is required.

   **NOTE:** Bypassing the Mercury Switch is performed solely for diagnostic purposes and is **NOT** intended for operation. **SERIOUS INJURY** could result from operating the Edger in this manner.

B. **Motor/Controller failure.** Using a voltmeter verify the motor controller's supply voltage.

1. Attach one lead of the meter to the white wire of the motor controller's amp-style connector.

2. Attach the other lead to the black wire at the motor's amp-style connector.

3. Ensure the meter is set to the AC voltage scale. Close the case top and cycle the edger.

When cycled, 115 Volts AC (230 VAC where applicable) should be read by the meter. If no voltage is present, check the wiring harness leads for breaks. If 115 Volts AC (230 VAC where applicable) is present at the connector, replacement of cutter motor/controller is required. Follow the procedures on **Page 50** for replacing the cutter motor.

**Motor is Noisy:**

A. **Cutter is unbalanced.** Ensure that the insert is fully seated in the cutter body. Remove the cutter body assembly and clean the motor shaft thoroughly with alcohol or acetone.

B. **Bearing failure.** If the motor is making a grinding, rough sound, it is an indication the bearings are going bad. Follow the procedures on **Page 50** for replacing the cutter motor.

## CYCLE IRREGULARITIES:

### Edger Won't Cycle:

#### Mercury Switch Malfunction.

1. Check the wires of the main mercury switch, mounted on the Plexiglas shield, for breaks.

2. If the wires appear to be in good condition, verify the switch operation by unplugging the switch's amp-style connector and placing a jumper wire in it's wiring harness receptacle. If the machine cycles normally, replacement of the mercury switch is indicated.

**NOTE:** Bypassing the mercury switch is performed solely for diagnostic purposes and is **NOT** intended for operation. **SERIOUS INJURY** could result from operating the Edger in this manner.

### Neither Motors Run - [Carriages move into cutting position but neither motors run]

**Mercury Relay Not Functioning.** Use a Voltmeter to verify operating voltages.

AC output voltage-

1. Connect one meter lead to the top of the Mercury Relay.

2. Connect the other lead to any large White neutral wire in the machine.

3. Ensure the meter is set to the AC voltage scale. Close the case top and cycle the edger.

If the relay is functioning 115 volts AC (230 VAC where applicable) should be read on the meter. If so, the White/Violet wires should be traced to locate any breaks. If no voltage is present at the relay output, the input voltage should be verified.

AC input voltage-

1. Switch the power to the Edger to the **OFF** position.

2. Connect one meter lead to the RED wire at the base of the Mercury Relay.

3. Connect the other lead to any large White neutral wire.

4. Switch the power to the **ON** position.

When the power is switched on 115 volts AC (230 VAC where applicable) should be read on the meter. The edger **DOES NOT** have to be cycled to check this voltage. If no voltage is present at the relay input, the RED wire should be checked for breaks. If input voltage is present, the DC Trigger voltage should be verified.

DC trigger voltage-

1. Connect the RED meter lead to the White/Red wire of the four conductor plug at the base of the relay.

2. Connect the BLACK meter lead to the Orange wire of the same plug.

3. Ensure the meter is set to the DC voltage scale. Close the casetop and cycle the edger.

24 volts DC should read on the meter. If voltage is present, replacement of the relay is indicated. If no trigger voltage is present, the wires should be checked from the plug to the control for breaks. If no breaks are found, replacement of the control panel is indicated.

<u>CUTTER MOTOR MOVES INTO THE ROUGHING POSITION BUT NOT INTO BEVELING POSITION (i.e. ONLY GIVES RIMLESS CUT)</u>:

A. **Rimless switch is depressed.** Ensure that the rimless switch is not depressed. If activated, the switch should be lit.
B. **Insufficient tracking pressure.** Ensure that the tracking pressure is set in accordance with the maintenance and operating specifications.
C. **Faulty tracking cylinder.** Disconnect the air from the right side of the edger. Manually extend and retract the Lens Tracking Cylinder Shaft in a slow steady manner. The shaft should move smoothly, in both directions, through its range of travel. If not, replacement of the cylinder is indicated.

<u>CUTTER MOTOR MOVES INTO THE BEVELING POSITION BUT WILL NOT BEVEL THE LENS</u>:

A. **The Bevel Guide Wheel is set too low.** If the BGW is not set the proper distance from the cutting blades, the lens may ride up on the edge of the Teflon ring. Follow the procedures on **Page 28** for setting BGW height.

B. **Differential is not closing.** Follow the procedures on **Page 31** for verifying the differential flow rate.

**Carriage Flow:**

LENS DRIVE FORWARD FLOW RATE IS TOO SLOW:

**Blocked Flow Restrictor.** Locate the **IFC-14** restrictor/check valve in airline #6 of the Lens Drive Carriage Flow Cylinder, and follow the procedures on **Page 49** for removal and cleaning.

LENS DRIVE FORWARD FLOW RATE IS TOO FAST:

A. **Air Leak.** Check the fittings and air connections on the flow cylinder and the solenoid for leaks.
B. **Open Check Valve.** Locate the **IFC-14** restrictor/check valve, located in airline #6 of the Lens Drive Carriage Flow Cylinder, and follow the procedures on **Page 49** for removal and cleaning.

LENS DRIVE WILL NOT FLOW FORWARD:

A. **Blocked Restrictor.** Locate the **IFC-14** restrictor/check valve in airline #6 of the Lens Drive Carriage Flow Cylinder, and follow the procedures on **Page 49** for removal and cleaning.
B. **Open Check Valve.** Locate the **1375-2** check valve, in airline #11 of the Lens Drive Carriage Flow Cylinder, and follow the procedures on **Page 49** for removal and cleaning.
C. **Solenoid Valve Malfunction.** Refer to **Page 45** for Solenoid identification and troubleshooting.

LENS DRIVE REARWARD FLOW RATE IS TOO SLOW OR WILL NOT FLOW AT ALL:

**Blocked Flow Restrictor.** Locate **RF354** restrictor, in airline #5 of the Lens Drive Carriage Flow Cylinder, and follow the procedures on **Page 49** for removal and cleaning.

CUTTER MOTOR FLOW TO THE LEFT IS TOO SLOW OR WILL NOT FLOW AT ALL:

A. **Blocked Flow Restrictor.** Locate the **RF354** restrictor, located in airline #8 of the Cutter Motor Carriage Flow Cylinder, and follow the procedures on **Page 49** for removal and cleaning.
B. **Solenoid Valve Malfunction.** Refer to **Page 45** for Solenoid identification and troubleshooting.

CUTTER MOTOR FLOW TO THE RIGHT IS TOO SLOW OR WILL NOT FLOW AT ALL:

**Blocked Flow Restrictor.** Locate the **IFC-32** restrictor/check valve, located in airline #7 of the Cutter Motor Carriage Flow Cylinder, and follow the procedures on **Page 49** for removal and cleaning.

CUTTER MOTOR FLOW TO THE RIGHT IS TOO FAST:

A. **Air Leak.** Check the fittings and air connections on the flow cylinder and the solenoid for leaks.
B. **Open Check Valve.** Locate the **IFC-32 restrictor**/check valve, located in airline #7 of the Lens Drive Carriage Flow Cylinder, and follow the procedures on **Page 49** for removal and cleaning.

DIFFERENTIAL WILL NOT OPEN:

A. **Blocked Flow Restrictor.** Locate the **IFC-11/IFC-15** restrictor/check valve assembly, located in airline #9, and follow the procedures on **Page 49** for removal and cleaning.
B. **Solenoid Valve Malfunction.** Refer to **Page 45** for Solenoid identification and troubleshooting.

DIFFERENTIAL WILL NOT CLOSE:

**Blocked Flow Restrictor.** Locate the **IFC-11/IFC-15** restrictor/check valve assembly, located in airline #9, and follow the procedures on **Page 49** for removal and cleaning.

DIFFERENTIAL CLOSES TOO FAST:

A. **Air Leak.** Check the fittings and air connections on the differential cylinder and the solenoid for leaks.
B. **Open Check Valve.** Locate the **IFC-11/IFC-15** restrictor/check valve assembly, located in airline #9, and follow the procedures on **Page 49** for removal and cleaning.

FLOW CONTROLLED CYCLE WILL NOT OPERATE:

The Lens Drive Carriage flows forward at a steady rate even though the Flow Rate has been activated.

A. **Lens Drive Flow Rate too fast.** If the forward flow rate of the Lens is too fast, the flow rate may not have time to activate. Follow the procedures on **Page 31** for verifying the Lens Drive Carriage Flow Rate.

B. **Air Leak.** Check the fittings and air connections on the Lens Drive Flow cylinder and the solenoid for leaks.
C. **Solenoid Valve Malfunction.** Follow the procedures on **Page 47** for troubleshooting the Flow Rate Solenoid.

## LENS DRIVE ASSEMBLY:

LENS DRIVE MOTOR CONTINUES TO RUN [At end of Cycle]:

A. **Broken Wire.** Use a multimeter and check the wires leading from the switch's amp-type connector to the control panel, if a break is indicated, it must be located and repaired.
B. **Proximity Switch Malfunction.** Place a jumper wire from the Black wire to the Blue wire at the switch's amp-type connector, if the motor ceases to run, the switch will need to be replaced.
C. **Control Panel Malfunction.** Disconnect the control panel from the wiring harness at its 15-conductor connector, if the motor ceases to run, replacement of the control panel is indicated.
D. **Faulty Mercury Relay.** If the motor continues to run with the control panel unplugged, a malfunction of the mercury relay is indicated and the relay should be replaced.

LENS DRIVE MOTOR DOESN'T RUN:

A. **Lens Drive Circuit Breaker Tripped.** The Lens Drive circuit breaker is located on the Lens Clamp Cylinder mounting assembly. If the White button has popped up, reset by pressing the button down so that it is flush with the housing.
B. **Diode Pack is Bad.**

1. Connect a voltmeter to the brake side of the diode pack.

2. Ensure the meter is set to the AC voltage scale. Close the case top and cycle the edger.

If the diode pack is functioning, 55 Volts AC (115 VAC where applicable) or half of the line voltage should be measured. If no voltage is present, verify the AC voltage to the diode pack.

1. Connect one meter lead to the RED wire of the lens drive motor's three conductor amp-type connector.

2. Connect the other meter lead to the BLACK wire of the lens drive motor's three conductor amp-type connector.

3. Ensure the meter is set to the AC voltage scale. Close the case top and cycle the edger.

115 Volts AC (230 VAC where applicable) should be present. If the voltage is present at the motor's connector but not at the diode pack connector, the diode pack will need to be replaced.

C. **Broken wire.** If no voltage is measured at the motor's connector, the wires should be checked for breaks. Using a multimeter, check the White/Violet wire from the motor's connector to the Mercury Relay and the White wire from the motor's connector to the power receptacle for breaks.

D. **Faulty Lens Drive Capacitor.** If voltage is present at both connectors, check the capacitor by measuring the AC output voltage.

1. Connect one meter lead to Blue wire of motor's connector.

2. Connect the other meter lead to the Black wire at the motor's connector.

3. Ensure the meter is set to the AV voltage scale. Close the case top and cycle the edger.

If the capacitor is functioning, 115 Volts AC (230 VAC where applicable) should be measured, if no voltage is present, check the wires for breaks, if no breaks are located, replacement of the capacitor is indicated.

E. **Lens Drive Brake Malfunction.** If voltage is present at all connectors the brake should be checked.

1. Loosen the two set screws securing the brake's locking collar and slide the collar off the shaft.

2. Close the case top and cycle the edger.

If the motor now operates, replacement of the brake is indicated, refer to **Page 52** replacing the Lens Drive Brake. If the motor still will not operate, replacement of the Lens Drive Assembly is indicated.

## SOLENOID VALVES:

### Identification:

For identification purposes, the solenoid valves are referred to as numbers 1-5 from left to right.

#1. Controls the opening and closing of the lens and pattern clamps.

#2. Controls the forward and return movement of the Lens Drive Assembly.

#3. Controls the left and right movement of the Cutter Motor Assembly.

#4. Controls the opening and closing of the Differential.

#5. Controls the Finish Only cycle.

### Description:

The solenoid valves are electro-mechanical switches designed to control the flow of air in pneumatic systems. Keep in mind that it is possible to have either an electrical or mechanical malfunction of the solenoid.

### Electrical:

Each solenoid valve has a built-in indicator light, which can be used to determine if electrical power is reaching the solenoid. If a malfunction is indicated due to the failure of one of the pneumatic slides to operate locate the appropriate solenoid and cycle the edger. If the indicator light fails to light, an electrical problem is indicated.

1. Unplug one of the functioning solenoid leads (the wires may be disconnected by squeezing the receptacle and sliding the wires straight out).

2. Switch the wires with the suspected unit.

3. Cycle the edger.

If the problem remains in the same location, replacement of the solenoid is indicated, if the light of the solenoid, which is known to be good, now fails to light, an ohm meter should be used to check the wires from the solenoid to the

control panel for any possible breaks. (**Note:** The #5 solenoid only functions when the finish button is activated.)

**Mechanical:**

If the indicator lights when the edger is cycled, a mechanical problem or malfunctioning coil is indicated.

1. Locate the mechanical override button on top of the solenoid.

2. Using a ballpoint pen, depress the button.

If the solenoid functions by engaging the appropriate slide, an internal electric problem is indicated and the solenoid will have to be replaced. If the solenoid fails to operate using the manual override:

1. Remove the two screws securing the solenoid to the manifold block.

2. Clean the solenoid using compressed air and a small amount of alcohol.

3. Reinstall the solenoid ensuring the gasket is properly positioned.

If the solenoid does not function after being cleaned, replacement is indicated.

**FLOW RATE SOLENOID:**

The Flow Rate Solenoid is located next to the Lens Drive Flow Cylinder. It is only active when the Rimless Lock Switch and the Pause Switch are both depressed. The Flow Rate Solenoid allows for a gradual feed of the lens into the cutter when edging heavy polycarbonate lenses. When activated, the lens will feed at its normal rate for approximately ten seconds, at which time, the solenoid will shut off air flow from the cylinder and forward movement will stop. Each revolution of the Lens Drive, as the Actuator Magnet passes the Proximity Switch, the Flow Rate Solenoid will allow the Lens Drive to flow forward for a brief time. The amount the lens drive is allowed to flow forward is determined by the small knob on the control panel labeled FLOW RATE. A setting of "1" will allow a forward flow of approximately 2mm per revolution of the lens drive, a setting of "5" will allow a forward flow of approximately 8mm per revolution.

If failure is suspected:

1. Press the Rimless lock and Pause switches.

2. Close the top and cycle the edger.

3. Watch the LED indicator on the solenoid.

After approximately ten seconds, the LED indicator should light, this will indicate power to the solenoid. Every revolution of the lens as the Actuator Magnet passes the proximity switch the light should go out momentarily. If the LED indicator fails to light, verify DC power using a voltmeter.

1. Connect the Red meter lead to the White/Red wire of the Amp-style connector.

2. Connect the Black meter lead to the White/Violet wire of the Amp-style connector.

3. Ensure the meter is set to the DC voltage scale. Close the case top and cycle the edger.

When the cycle is first started there should be no voltage present. After approximately ten seconds the meter should indicate approximately 24 volts DC. Every revolution of the lens as the Actuator Magnet passes the Proximity Switch the meter should momentarily read zero volts. If none or very low voltage is indicated, use a multimeter to check the wires from the Amp-style connector back to the control panel for breaks. If a broken wire is indicated, the break will have to be located and repaired. If no break is indicated, the Control Panel will have to be replaced.

## FLOW RESTRICTORS:

The Flow Restrictors have fixed orifices that, in conjunction with check valves, regulate the movement of the Lens Drive carriage, Cutter Motor carriage and Differential.

**Identification:**

LENS DRIVE CARRIAGE FLOW CYLINDER:

**IFC-14** - This is a Restrictor/Check Valve combination. Located in airline #6, it regulates the forward movement of the Lens Drive carriage.

**1375-2** - This is a check valve. Located in airline #11 it acts to shut off air to the Lens Drive Flow Cylinder when the Finish Only cycle is **NOT** being utilized.

**RF354** - This is a Flow Restrictor. Located in airline #5, it regulates the rearward movement of the Lens Drive carriage.

CUTTER MOTOR FLOW CYLINDER:

**RF354** - This is a Flow Restrictor. Located in airline #8, it regulates the Cutter Motor carriage movement to the left.

**IFC-32** - This is a Restrictor/Check Valve Combination. Located in airline #7, it regulates the Cutter Motor carriage to the right.

DIFFERENTIAL CYLINDER:

**IFC-11/IFC-15** - The Differential uses two Restrictor/Check Valve Combinations in series as one assembly. Located in airline #9, the assembly regulates both the opening and the closing of the differential.

The Restrictors/Check Valves utilize quick disconnect fittings to allow easy removal from and installation in the airlines. Before removing from the airline, take note of its orientation in the line, as it must be reinstalled in the same manner. The Restrictor/Check Valve will not function properly if it is reversed in the airline.

To remove from the airlines:

1. Disconnect the air from the right side of the edger.
2. Press the Red coupler on the end of the fitting towards the brass portion of the fitting and simultaneously pull the airline out of the fitting.

To install in the airline:

1. Slide the airline into the fitting until it stops.
2. Push the airline again, it should move about another 1/8" and lock in place.

CLEANING:

1. Disconnect the air from the right side of the edger and install the safety air gun supplied in the edger's accessory kit.

2. Remove the Restrictor/Check Valve from the airline.

3. Use the air gun to force air through the Restrictor/Check Valve in both directions.

**NOTE:** Because the Differential Restrictor assembly is two Restrictor/Check Valves in series, it will have to be disassembled, cleaned and the reassembled. Note the orientation of the parts so it can be reassembled so that the air flow is the same as before cleaning.

4. Reinstall the Restrictor/Check Valve.

## REPLACING THE CUTTER MOTOR:

1. Switch the POWER to the Edger to the **"OFF"** position.
2. Remove the cutter assembly from the motor.
3. Unplug the motor from the controller by rotating the connector.
4. Remove the four bolts holding the cutter motor to the cutter motor cradle.
5. Slide the motor out of the rear of the cradle.
6. Re-install in reverse order.
7. Follow steps under "Removing/Installing the Cutter Body" on **Page 22** to install the cutter assembly.

## REPLACING THE CONTROL PANEL:

1. Switch the power on the Edger to the **"OFF"** position.
2. Disconnect the **POWER** from the wall outlet.
3. Disconnect the air supply from the right side of the Edger.
4. Note the airline connections on the regulator assembly and disconnect the airlines from the regulator.
5. Disconnect the power switch at its three conductor amp-type connector.
6. Disconnect the Control Panel from the main wiring harness at it's 15 conductor amp-type connector.
7. Remove the eight button head screws and nuts securing the panel to the front of the machine and lift the panel out.
8. Insert the new Control Panel into the front of the machine and secure it with the eight screws and nuts.
9. Reconnect the airlines to the regulator as noted in Step 3.
10. Connect the Control Panel to the main wiring harness at its 15 conductor amp-type connector.
11. Connect the power switch to the power supply at its 3 conductor amp-type connector.
12. Reconnect the air supply to the right side of the Edger.

13. Set the pressure gauge on the front of the panel to 35 psi and check for air leaks.

14. Connect the power cord to a wall outlet.

15. Switch the power to the "ON" position and verify operation.

**REPLACING THE LENS DRIVE ASSEMBLY:**

1. Switch the power on the Edger to the **"OFF"** position.
2. Disconnect the **POWER** from the wall outlet.
3. Unplug the Lens Drive from the wiring harness at its 3 conductor amp-type connector.
4. Remove the three socket head screws securing the assembly to the slide plate and lift the assembly off.
5. Being careful to align the locating pins in the slide plate with the locating holes in the base of the motor, position the new assembly on the slide plate and secure it with the three socket head screws.
6. Connect the motor to the wiring harness at it's 3 conductor amp-type connector and secure the wires.
7. Connect the power cord to the wall.
8. Switch the power to the **"ON"** position.
9. Follow the procedures on **Page 36** for verifying and adjusting **AXIS.**

**REPLACING THE LENS DRIVE BRAKE:**

1. Switch the power to the **OFF** position.
2. Unplug the Diode pack from the Brake's 2 conductor amp-style plug.
3. Loosen the two set screws securing the brake's locking collar and slide the collar off the shaft.
4. Remove the three Phillips head screws securing the brake to the rear of the Lens Drive Motor and slide the Brake off the shaft.
5. Slide the new Brake over the shaft and secure it to the rear of the motor with the three Phillips head screws.
6. Slide the locking collar over the shaft and into the brake. Be careful not to pinch the fiber disk inside the brake.

7. Align the set screws on the locking collar with the flats on the motor shaft and position the collar on the shaft so that only the chamfered end of the shaft (about 1/16") protrudes past the collar.

8. Tighten the set screws securing the collar to the shaft.

9. Reconnect the Diode Pack to the Brake's 2 conductor amp-type connector.

**REPLACING THE SOLENOID VALVE:**

1. Switch the power to the **"OFF"** position.

2. Disconnect the air supply from the right side of the Edger.

3. Unplug the Solenoid to be replaced by squeezing the connector at the end of the solenoid and gently pulling the connector out.

4. Remove the two screws securing the solenoid to the valve block and lift the solenoid valve and gasket off of the block.

5. Clean the top of the block, being careful not to let debris fall into the block.

6. Position the new solenoid valve and gasket on the block and secure with the two screws.

7. Carefully insert the wiring connector into the receptacle at the end of the solenoid.

8. Reconnect the air supply to the right side of the Edger and check for air leaks.

**REPLACING THE SOLENOID VALVE BLOCK ASSEMBLY:**

1. Switch the power to the **"OFF"** position.

2. Disconnect the air supply from the right side of the Edger.

3. Unplug the Solenoid Valve Block Assembly from the wiring harness at its 6 conductor amp-type connector.

4. Note the position of the airlines and disconnect them from the valve block.

5. Remove the two socket head screws securing the valve block to the base of the machine and lift the assembly out of the machine.

6. Position the new assembly on the base plate and secure with the two socket head

screws.

7. Reconnect the airlines to the valve block as noted in step four.

8. Connect the assembly to the wiring harness at its 6 conductor amp-type connector.

9. Reconnect the air supply to the right side of the edger and check for air leaks.

**REPLACEMENT FUSES:**

The fuse ratings are as follows:

| | |
|---|---|
| Motor Power Fuse: | 250 Volt, 5A, Slow - Blow |
| Motor Line Fuse: | 250 Volt, 15A, Slow - Blow |
| Transformer: | 300 Volt, 0.5A, Fast Acting, Bussman GLR type |

**Replacing the cutter inserts:**

1. Using the "TORX" wrench provided in the accessory kit, loosen the screws that secure the retaining clamps. **Note:** A common mistake is to use an Allen wrench to remove the TORX screws. This will strip the screws, making the inserts nearly impossible to remove.

2. Slip the insert out of the body.

3. Thoroughly clean the cutter body and the clamps in a solvent (acetone or alcohol) and blow them dry with the air gun supplied in the accessory kit.

4. Replace the inserts by pushing them as far as possible to the back of the cutter body. This will ensure the alignment of the inserts.

5. Alternate the tightening of each screw 2-3 times, until the clamps are evenly seated and tightened securely.

**SAFETY NOTE: FAILURE TO SECURELY TIGHTEN THE INSERT CLAMPS PRESENTS A SAFTEY HAZARD.**

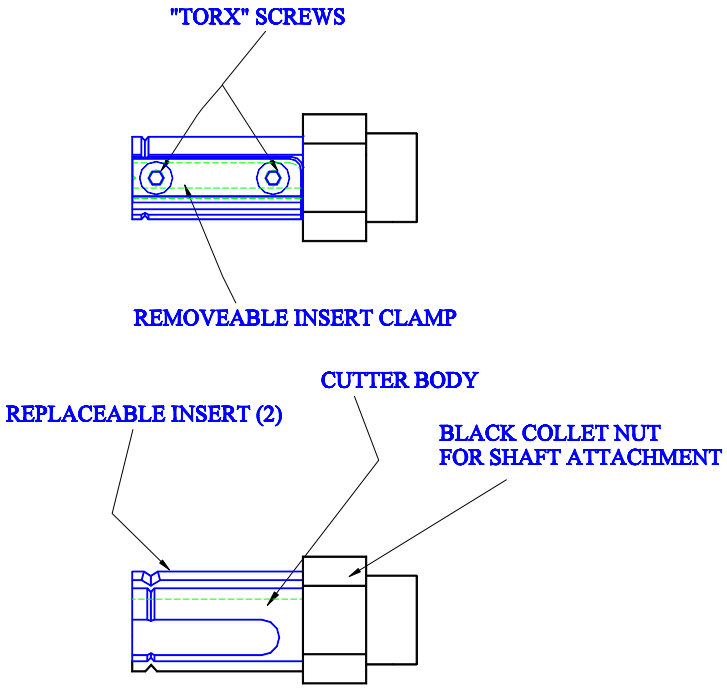



***Figure A1- Bosch Cutter Body***

**Resharpening Service:**

All National Optronics carbide cutter inserts, barring disposable carbide inserts, are entitled to receive two resharpenings at *no charge*. After two resharpenings, the inserts are worn out of tolerance and need to be replaced. The normal resharpening turn-around time is 24-48 hours from receipt of the insert set at the factory.

**Note:** To assure maximum life through the resharpening process, it is important not to let the inserts become too dull, as they tend to chip in the last stages of edge life. If an insert set is too badly worn or damaged to be resharpened, a new insert set is sent as a replacement, and is billed to your account. This is done to ensure that your lab is not short an insert set.

When an insert is resharpened, a notch is ground in the end to indicate that it has been resharpened. Two notches indicate it has been resharpened twice and, if returned to the factory, it will automatically be replaced with a new set.

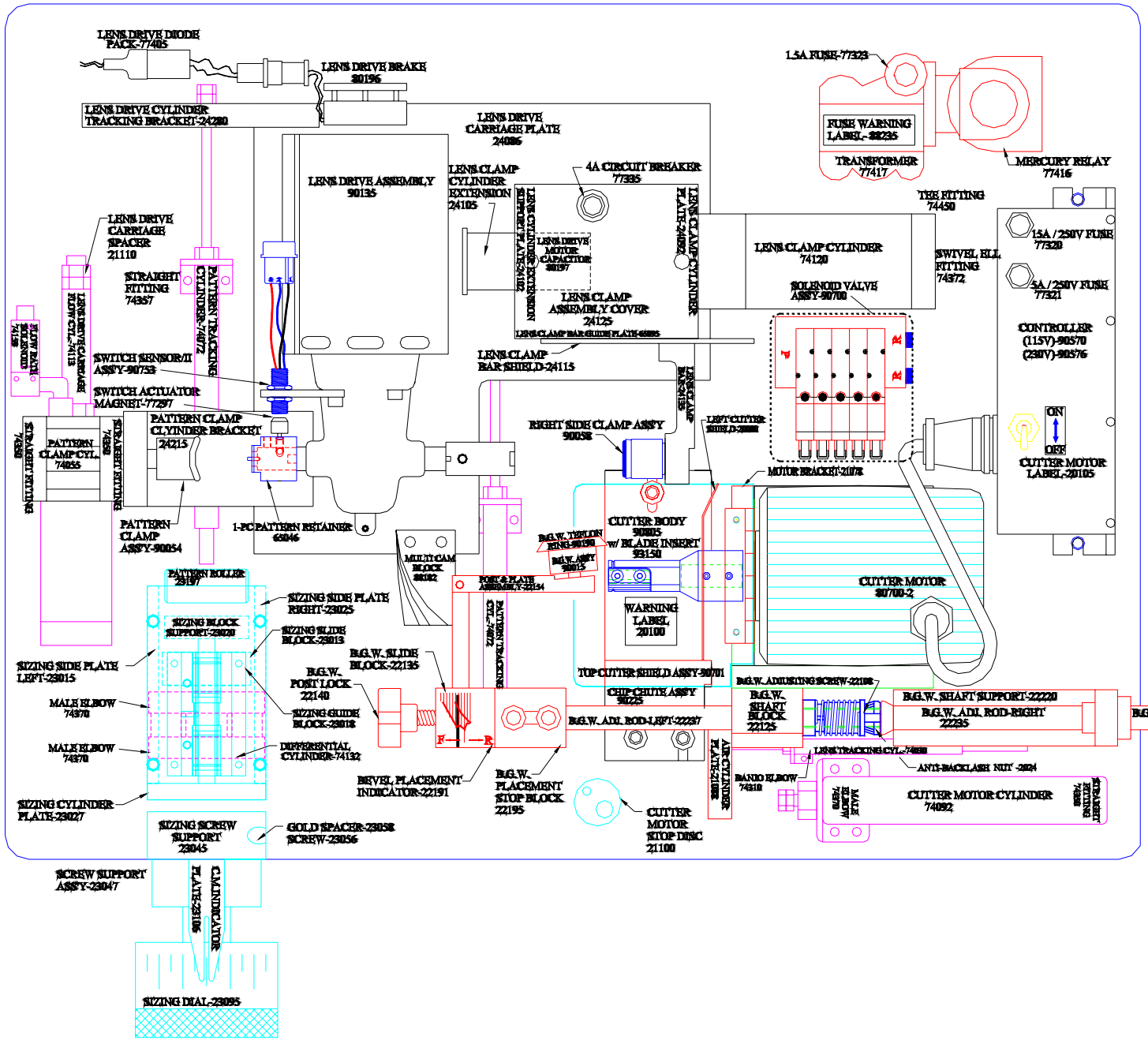
When returning the insert sets to the factory, please follow these guidelines:

1. Replace them *as sets* in the original pouch. The inserts are extremely brittle and will chip if allowed to hit each other during the shipment.

2. *Enclose a slip of paper, P.O., or some other identification* and ship (or mail) them to the factory. This will allow us to provide better service.

3. Ship the cutters back in a box, not an envelope. This will serve to protect the cutters sufficiently.

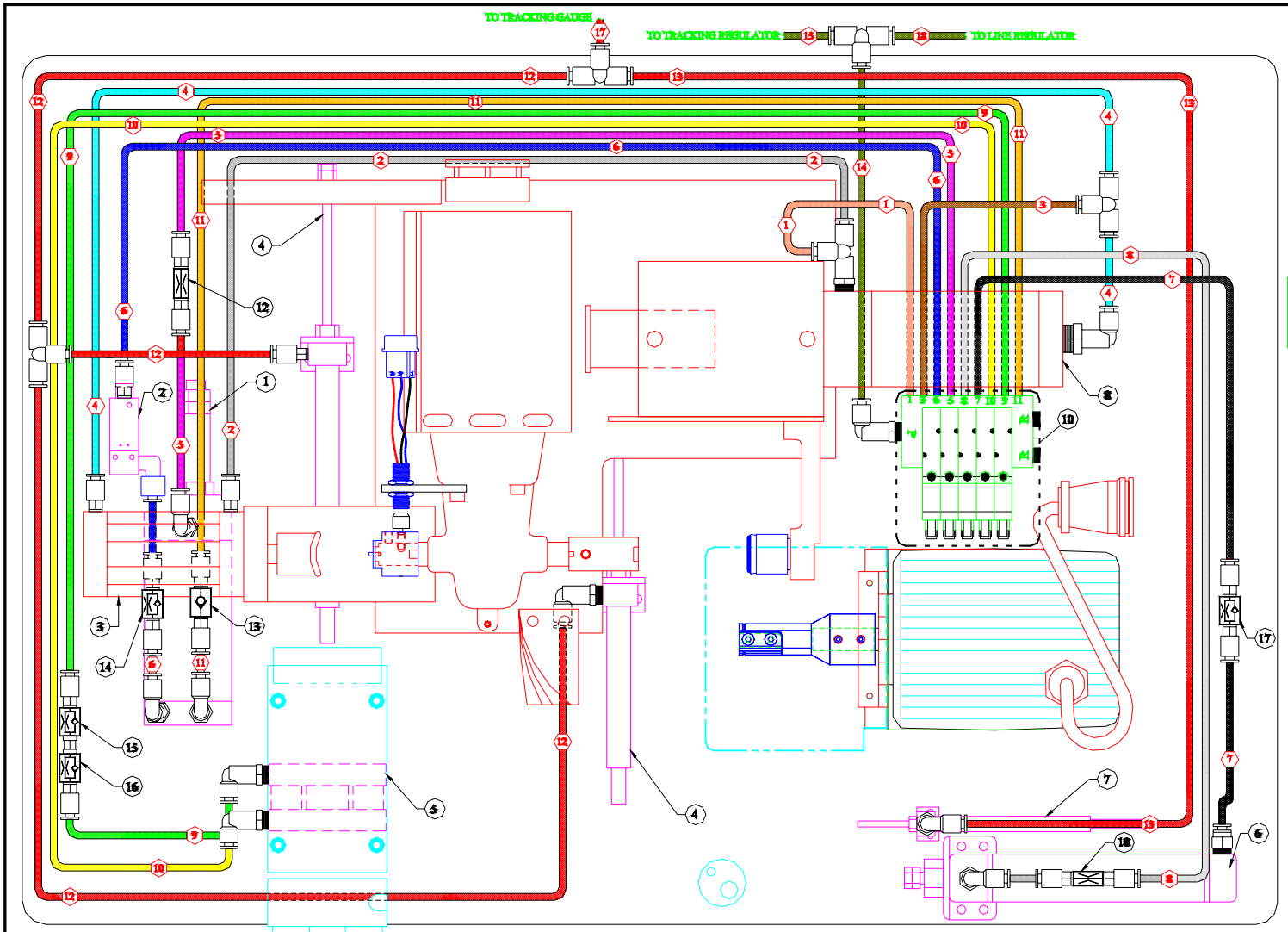
4. Indicate how you would like the inserts returned (i.e., UPS Next Day, Parcel Post, FedEx). If not indicated, all inserts are returned UPS Ground.

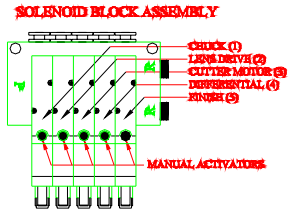


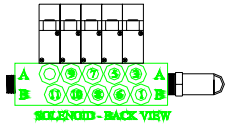

NATIONAL OPTRONICS INCORPORATED

HORIZON II DRY BEVEL EDGER
PART NO. REFERENCE DIAGRAM

02-03-98




| NO. | DESCRIPTION | PART NO. | NO. | DESCRIPTION | PART NO. | ASSY NO. w/ FITTINGS |
|---|---|---|---|---|---|---|
| 1 | LENS DRIVE CARRIAGE FLOW CYL. | 74113 | 10 | SOLENOID VALVE ASSEMBLY | 90700 | 90700 |
| 2 | FLOW RATE SOLENOID | 74159 | 11 | N/A | N/A | N/A |
| 3 | PATTERN CLAMP CYLINDER | 74056 | 12 | RESTRICTOR .0225 (RF354) | 74168 | 90705 |
| 4 | PATTERN TRACKING CYLINDER | 74072 | 13 | CHECK VALVE (1375-2) | 74165 | 90704 |
| 5 | DIFFERENTIAL CYLINDER | 74132 | 14 | FIXED FLOW CONTROL (IFC14) | 74163 | 90706 |
| 6 | CUTTER MOTOR FLOW CYLINDER | 74092 | 15 | CHECK VALVE/RESTRICTOR (IRC11) | 74162 | 90430 |
| 7 | LENS TRACKING CYLINDER | 74030 | 16 | CHECK VALVE/RESTRICTOR (IRC15) | 74161 | |
| 8 | LENS CLAMP CYLINDER | 74120 | 17 | CHECK VALVE/RESTRICTOR (IRC32) | 74174 | 90707 |
| 9 | N/A | N/A | 18 | RESTRICTOR/70mm | 74347 | 90752 |

⬡ = COMPONENTS

⬢ = CIRCUITS

| | | |
|---|---|---|
| | 10-32 NPT MALE ELBOW | 74310 |
| | 1/8" NPT MALE ELBOW | 74370 |
| | 1/4" NPT MALE ELBOW | 74372 |
| | 1/8" NPT MALE STRAIGHT | 74380 |
| | 10-32 NPT MALE STRAIGHT | 74357 |
| | 5/32" TUBE TEE | 74460 |
| | 5/32" MALE RUN TEE (1/4" NPT) - 2 WAY | 74450 |
| | 10-32 SHORT COUPLING | 74282 |

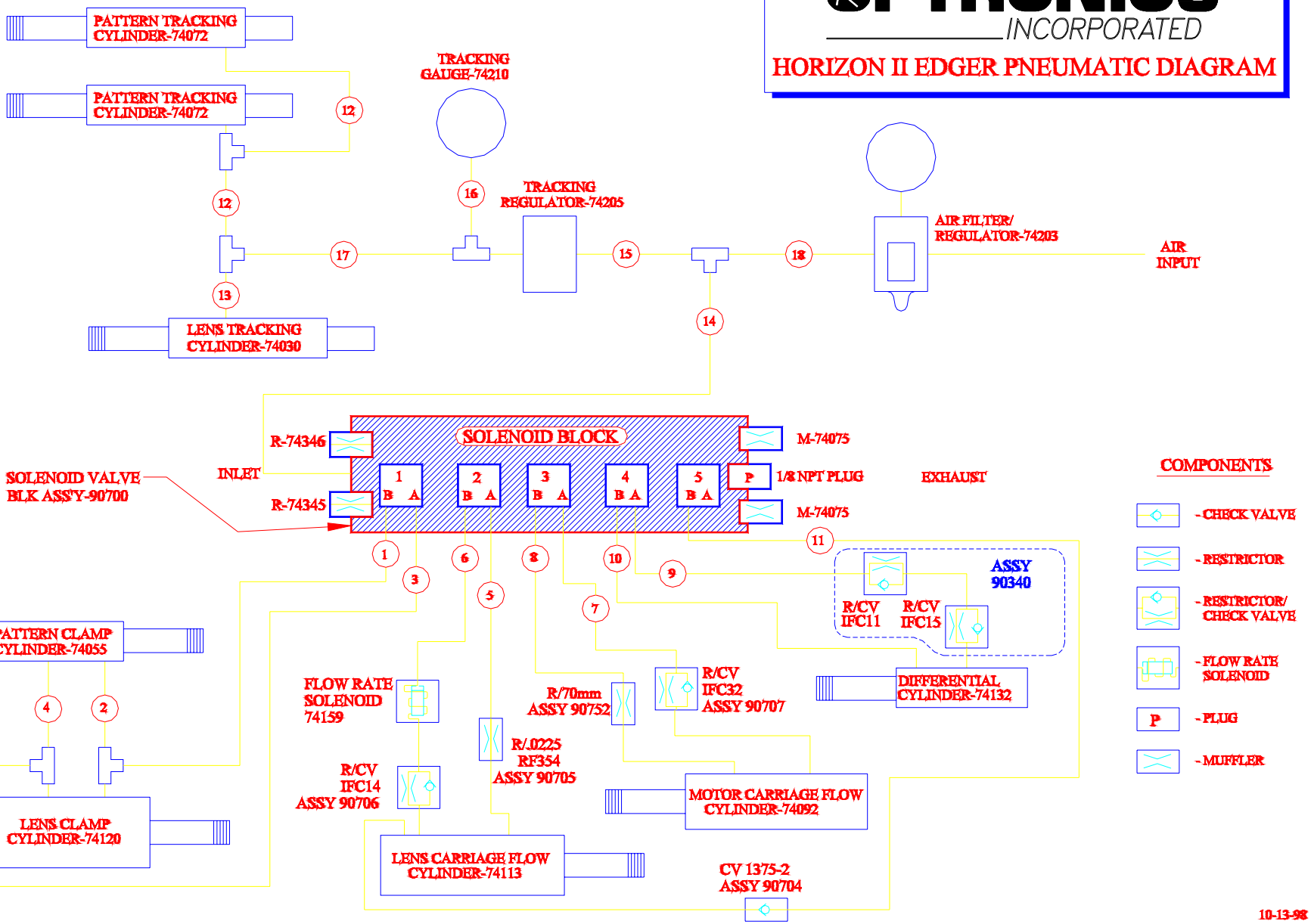
NATIONAL OPTRONICS INCORPORATED

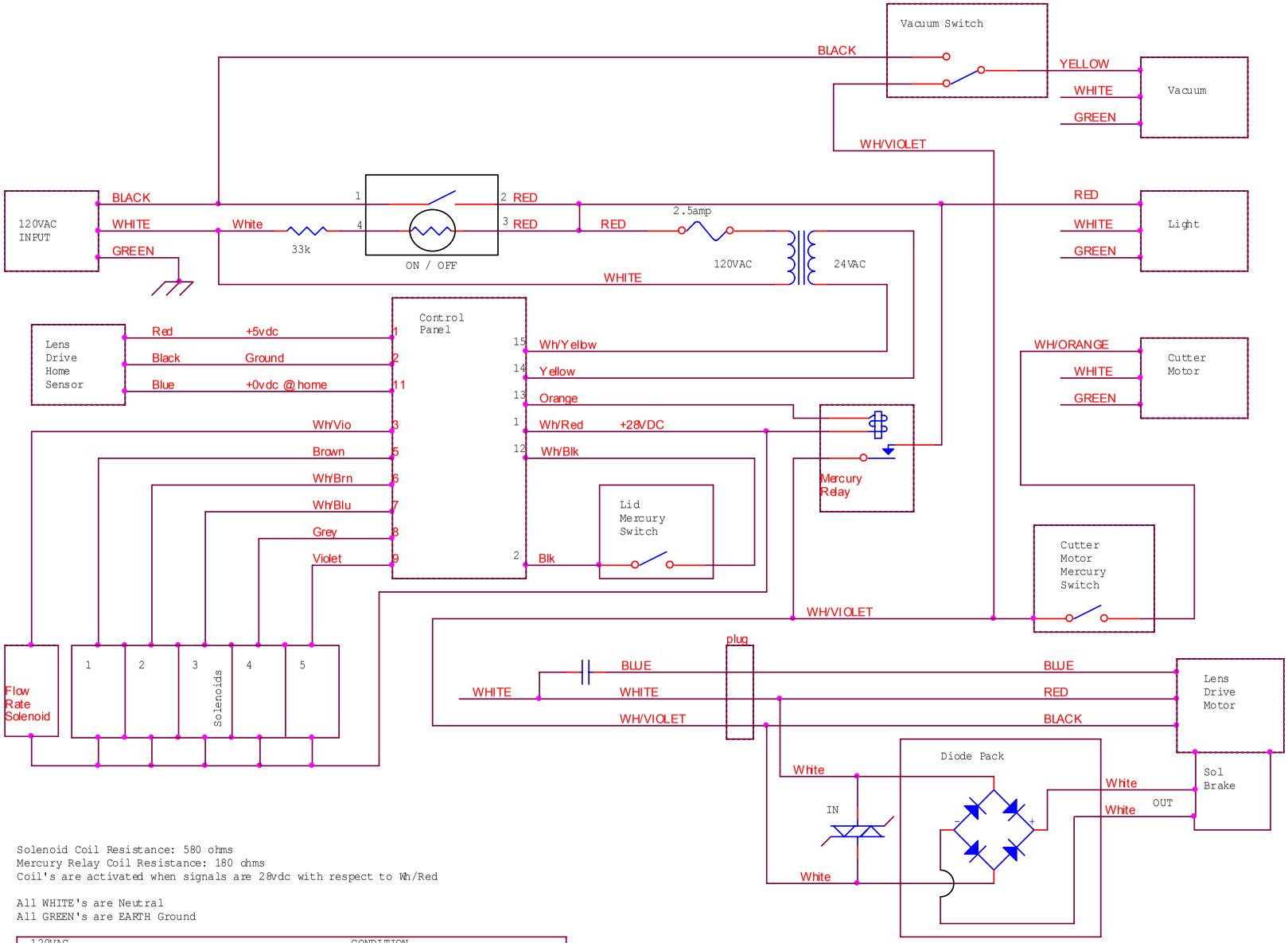
HORIZON II DRY BEVEL EDGER
PNEUMATIC ASSEMBLY DIAGRAM

02-03-98

NATIONAL OPTRONICS INCORPORATED

# HORIZON II EDGER PNEUMATIC DIAGRAM





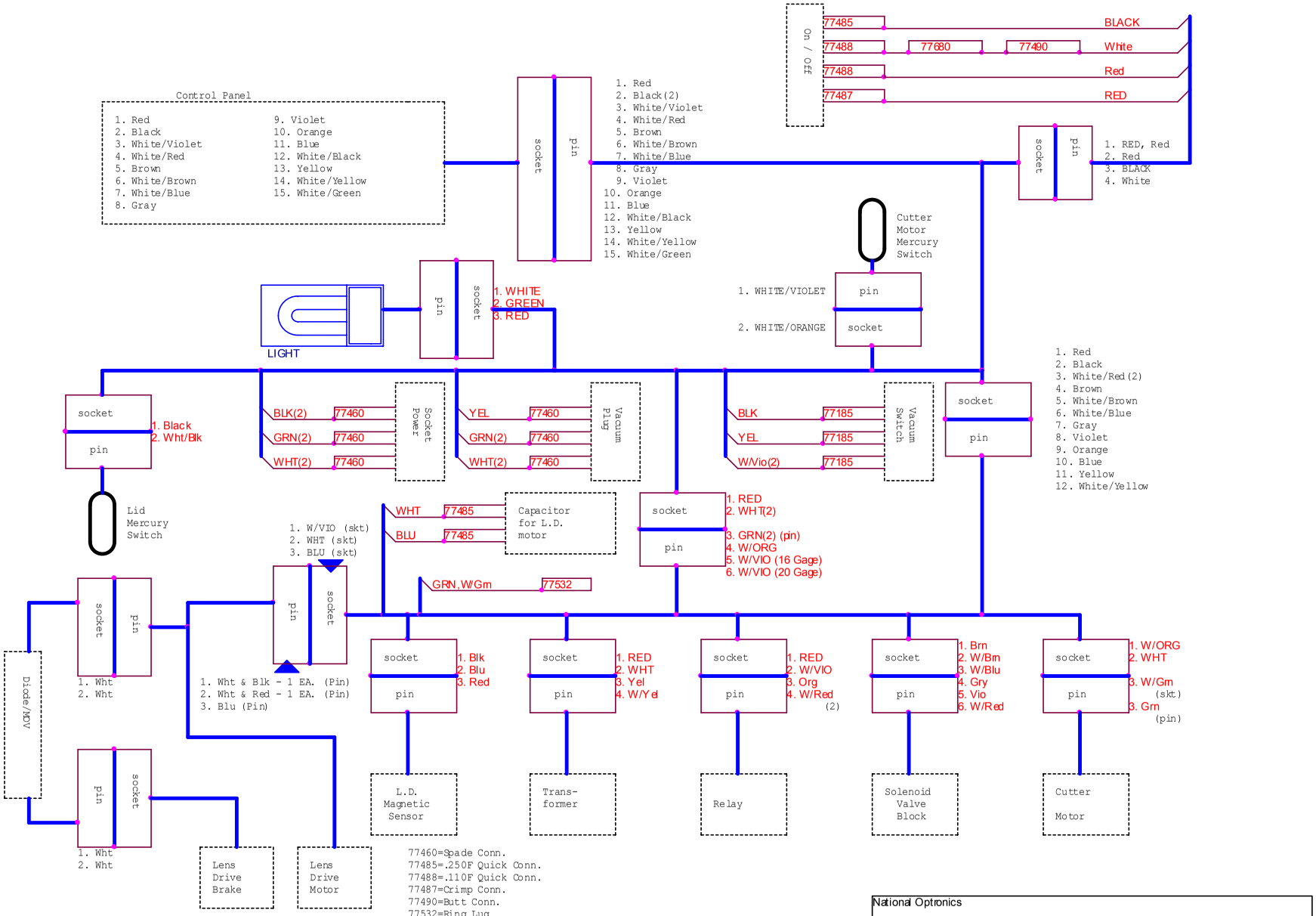

Solenoid Coil Resistance: 580 ohms
Mercury Relay Coil Resistance: 180 ohms
Coil's are activated when signals are 28vdc with respect to Wh/Red

All WHITE's are Neutral
All GREEN's are EARTH Ground

| 120VAC | CONDITION |
|---|---|
| WHITE-BLACK | plugged in |
| WHITE-RED | power ON |
| WHITE-WHITE/VIOLET | durring cycle |
| WHITE-WHITE/ORANGE | durring cycle & case top down |

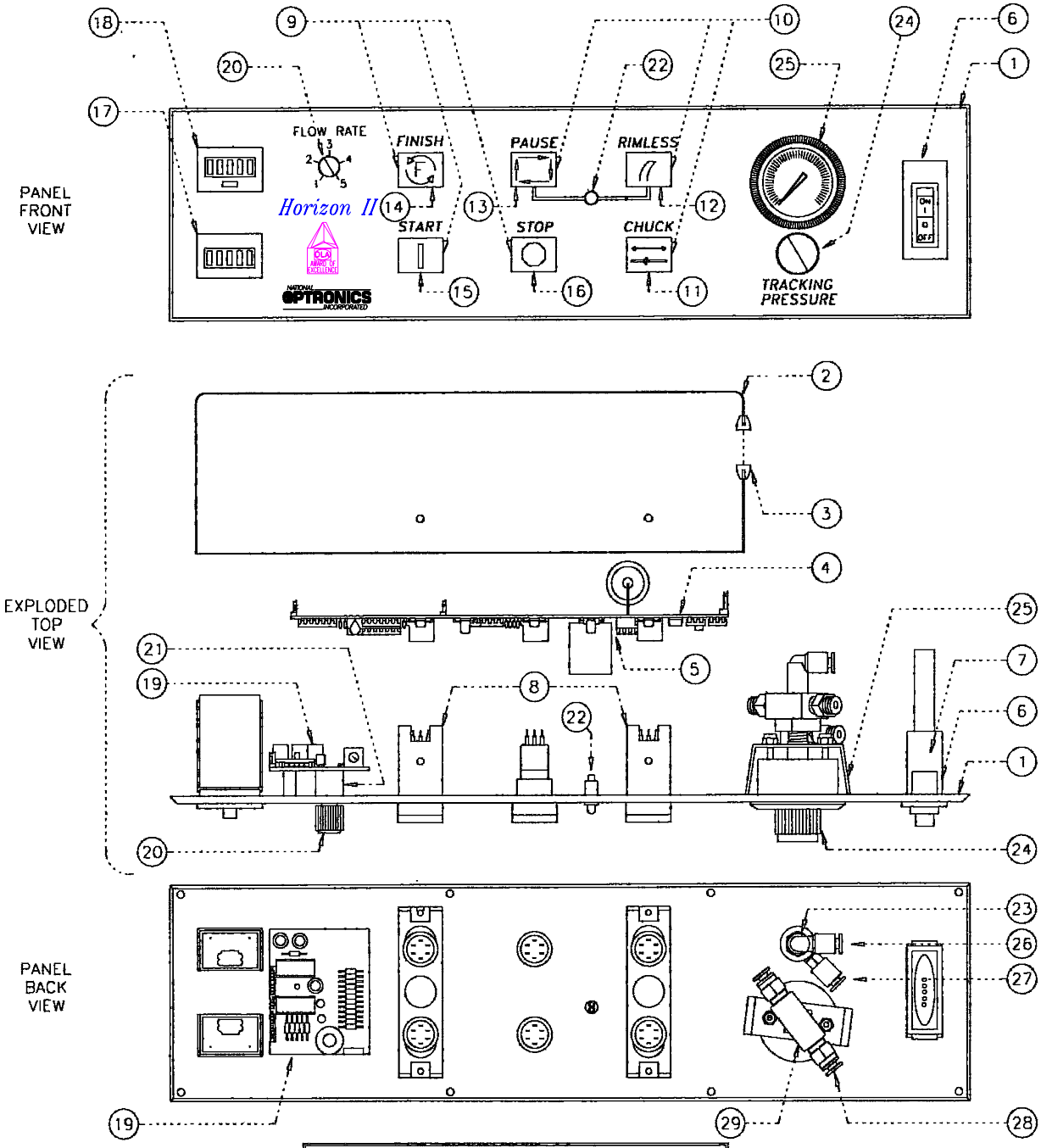
Voltages can also be taken with respect to GREEN instead of WHITE

| National Optronics | | |
|---|---|---|
| Size: A | Document Number: Horizon II Wiring Diagram | Rev: A |
| Date: Friday, October 09, 1998 | Sheet 1 of 1 | |




National Optronics

| Size | Document Number | Rev |
|---|---|---|
| A | HII Interconnecting Wiring Diagram | B |
| Date: Thursday, October 15, 1998 | Sheet 1 of 1 | |




## HORIZON II CONTROL PANEL ASSEMBLY
## ASSEMBLY PART NO. 94420

| NO | PART NO | QTY | DESCRIPTION | NO. | PART NO | QTY | DESCRIPTION |
|---|---|---|---|---|---|---|---|
| 1 | 82088 | 1 | CONTROL PANEL | 16 | 77264 | 1 | SWITCH COVER - RED |
| 2 | 82100 | 1 | SWITCH COVER | 17 | 77424 | 1 | CUMULATIVE COUNTER |
| 3 | 73175 | 1 | PANEL GROMMET | 18 | 77426 | 1 | RESET COUNTER |
| 4 | 77122 | 1 | CONTROL BOARD | 19 | 77125 | 1 | FLOW CONTROL BOARD |
| 5 | 77329 | 1 | 2A PC MOUNT FUSE | 20 | 77406 | 1 | FLOW CONTROL KNOB |
| 6 | 77204 | 1 | ON/OFF SWITCH | 21 | 77402 | 1 | FLOW CONTROL POTENTIOMETER |
| 7 | 77680 | 1 | ON/OFF SWITCH RESISTOR | 22 | 77679 | 1 | FLOW CONTROL INDICATOR |
| 8 | 20112 | 2 | SWITCH COVER MTG BRKT. | 23 | 74205 | 1 | PRESSURE REGULATOR |
| 9 | 77182 | 3 | MOMENTARY SWITCH | 24 | 74207 | 1 | PRESSURE REGULATOR KNOB |
| 10 | 77184 | 3 | MAINTAINED SWITCH | 25 | 74210 | 1 | PRESSURE REGULATOR GAUGE |
| 11 | 77214 | 1 | SWITCH COVER - BLUE | 26 | 74310 | 2 | BANJO ELBOW |
| 12 | 77224 | 1 | SWITCH COVER - BLACK | 27 | 74357 | 2 | #10-32 STRAIGHT FITTING |
| 13 | 77234 | 1 | SWITCH COVER - YELLOW | 28 | 74350 | 2 | 1/8" NPT STRAIGHT FITTING |
| 14 | 77244 | 1 | SWITCH COVER - ORANGE | 29 | 74359 | 1 | 1/8" THREADED FEMALE "T" |
| 15 | 77254 | 1 | SWITCH COVER - GREEN | | | | |

# H-II Accessory Kit Parts List

1 22244 HV-B Teflon Ring
1 73151 (Outer) Clamp O-Ring
1 73166 Replaceable RSC Pad
1 73168 Half-Eye Replaceable RSC Pad
2 65232 T-15 #6-32 x 3/8" Lg FHCS
3 (HDW) 6-32 x 3/8" Flathead Screws
1 74262 Quik Disconnect
1 74272 Male Coupler Fitting
1 87260 Blow Gun
1 87178 Hex Key Set
1 87256 T-15 Torx Driver
5 87605 Pattern Blank, Rectangle

1 90744 Filter/Regulator Assembly
- 1 - 74203 Filter Regulator
- 1 - 74272 Male Coupler Fitting
- 1 - 74305 Bulkhead Fitting
- 1 - 74290 Street Elbow
- 1 - 73131 O-Ring
- 1 - 24295 Bracket

1 90330 Multi-Cam Follower Assembly
- 1 - 65210 Ball Plunger
- 1 - 88140 Camtracking Shaft
- 1 - 88152 Camtracking Post
- 1 - 88160 Camtracking Knob
- 1 - 88170 Camtracking Block
- 1 - 88210 Camtracking Ind. Label
- 1 - 70210 Camtracking Follower Bearing

1 87462 5/32" T-Handle
1 87472 3/32" T-Handle

1 90055 Half-Eye Clamp Body Assembly
- 1 - 65135 Half Eye Clamp Body
- 1 - 65180 Lens Clamp Shaft
- 1 - 70250 Clamp Thrust Bearing
- 1 - 73167 Half Eye Rubber Pad
- 1 - 73180 Apple O-Ring

1 93153 Polishing Cutter - Disposable (10PK)
1 83702 PFL
1 Various PDA

**Fuse Selection**

| | |
|---|---|
| 115 VAC | 2 - 77320 15 Amp Fuse |
| | 2 - 77321 5 Amp Fuse |
| 230 VAC | 2 - 77320 15 Amp Fuse |